



NIGERIA

Annual Report on the Agricultural Department for the year 1949-50

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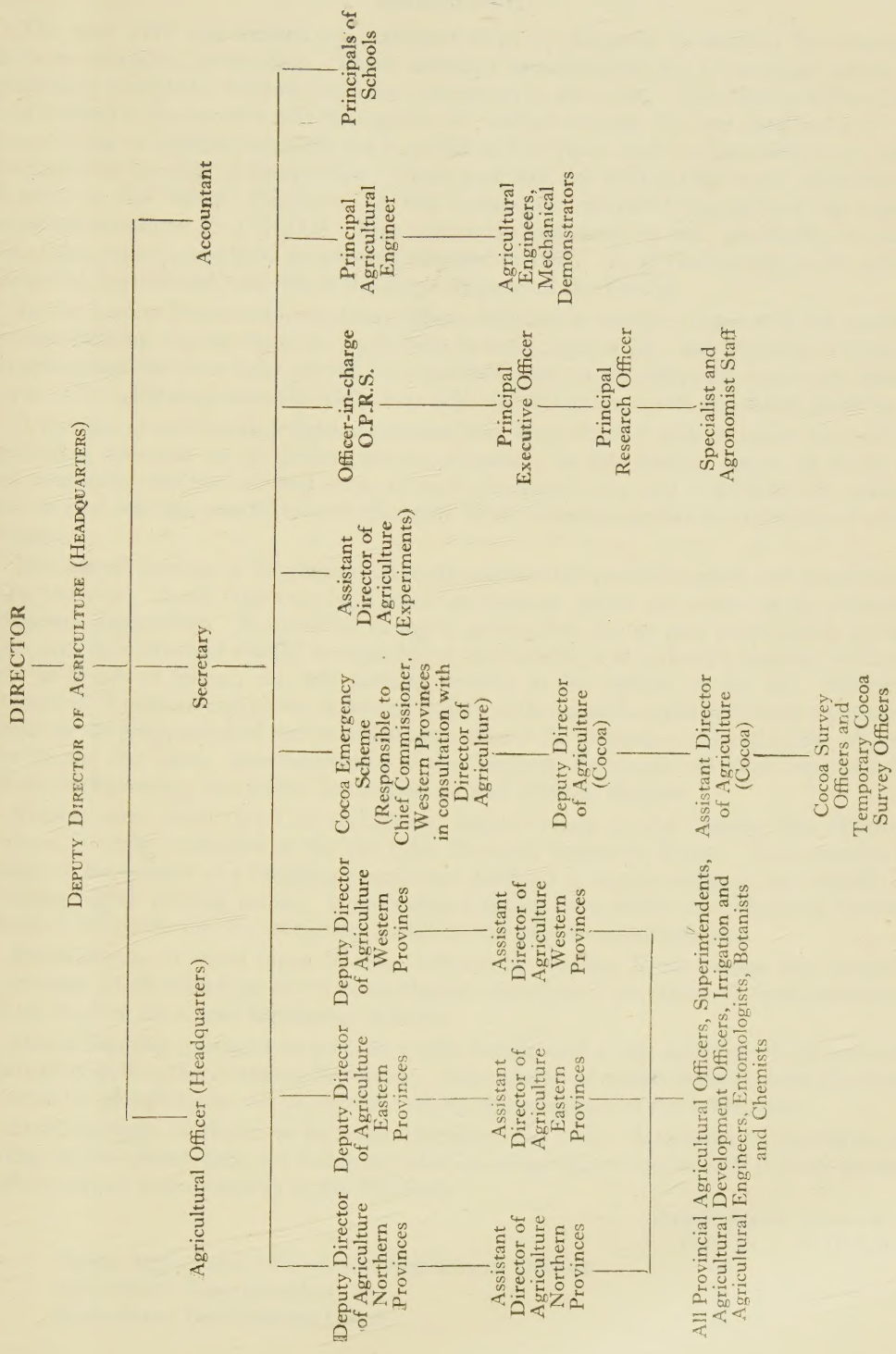
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A SKETCH PLAN OF THE ORGANISATION OF THE AGRICULTURAL DEPARTMENT, NIGERIA





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FOREWORD

The year 1949 was marked by important steps by Regional Production Development Boards to stimulate production. These included arrangements for a campaign aimed at popularising phosphatic fertilisers and for instruction in their use. The Northern Provinces Board decided to finance at a cost of a quarter of a million pounds, the free distribution of one thousand tons of fertiliser annually for a period of five years, and arrangements were made for commercial supplies to be available. Plans were laid also for the large-scale cultivation of rice lands in the Sokoto Province. In this connection estimated expenditure for capital equipment amounted to £136,000. Rice cultivation continued to gain popularity in many parts of the country, and good yields were obtained in 1949. In all these activities the advice of Regional Agricultural staff was at the direct disposal of the Boards.

In the Eastern Provinces it has been difficult hitherto to convince farmers of the increase in yields resulting directly from the application to their crops of lime and imported fertilisers, even where this has been fully proved by experiment, but in the campaign conducted during the year over 1,300 demonstration plots were laid out on farmers' plots and school gardens.

A number of small-scale irrigation schemes have been initiated with the aid of the limited Engineering resources at the Department's command. In this work it has to be borne in mind constantly that the size and scope of such schemes in any area must bear fair relation to the limited interest, experience and efficiency of the farming population in the use of water on crops.

Mechanical farming or Mechanisation in Agriculture has received a good deal of publicity during the year. Some Nigerians have been too ready to herald the tractor as the salvation of Nigerian Agriculture. It would be wrong to permit this idea to pass uncorrected, for the tractor and its equipment should be regarded as instruments which though valuable in themselves as savers of labour, can add nothing directly to the fertility of the soil. Effective contribution of modern equipment is limited largely to the valuable capacity of such equipment to assist in the preparation of increased acreages of land for planting at the right time of year. Eight tractor unit farms were established in the Northern Provinces and some experimental work in mechanisation was started in the Eastern and Western Regions.

Fundamental work aimed at agricultural improvements in the Eastern and Western Provinces is being conducted at the Oil Palm Research Station at Benin. This research is essential to the success of a breeding programme designed to supply pedigree seed capable of producing higher yielding palms. It aims also at fitting these palms into improved farming systems in which the use of commercial fertilisers will play an important part.

Rehabilitation of cocoa farms in areas affected by Swollen Shoot disease has occupied the attention of all officers in the Western Region including in particular all those associated with the work of the Cocoa Emergency Scheme.

Mixed Farming continues to provide a solid background to the activities of Agricultural Department staff in the Northern Provinces. The number of mixed farmers, most of whom use cattle for ploughing as well as manure making, approximates to the 6,000 mark.

Staff shortages continued to be acute throughout the year. A measure of the degree of shortage can be gained from the following table covering Senior Service staff in three grades of officers whose work is mainly in the Provinces :—

	<i>Establishment Vacancies</i>	
	<i>1949-50</i>	<i>at 31-3-50</i>
Senior Agricultural Officers and Agricultural Officers ..	69	35
Agricultural Superintendent	21	8
Agricultural Development Officer	28	7
	—	—
	148	50
	—	—

Three missions of agricultural interest visited Nigeria during the year. A distinguished American Soil Scientist, Dr W. C. Lowdermilk, visited West Africa to make a personal study of local problems involving soil and water conservation. Accompanied by Mr G. W. Nye, O.B.E., Deputy Agricultural Adviser to the Secretary of State for the Colonies, three eminent Agricultural Research Administrators from the United States toured all three Regions in September in order to assess how the Economic Co-operation Administration could best assist Nigerian Agricultural Development. A third mission, sponsored by the Colonial Office and consisting of two East African agriculturists, visited Nigeria to investigate the possibilities of large-scale grain (Sorghum) production.

An International Conference was held at Oil Palm Research Station in early December at which delegates from the Belgian Congo, the French Union, the Netherlands and Nigeria took part. The Conference was an informal gathering of research workers interested in the oil palm, and was most valuable in bringing together those with a common interest in this field of science, and many subjects of mutual interest were discussed. Other conferences at which the Agricultural Department was officially represented during the year were :—

- (a) Indigenous Rural Economy Conference, Jos.
- (b) Land Utilisation Conference, Jos.
- (c) African Regional Scientific Conference, Johannesburg.
- (d) International West African Conference, Ibadan.
- (e) Colonial Office Summer Conference, Cambridge.

A. G. BEATTIE,
Director of Agriculture.

Report of the Agricultural Department, Northern Region

STAFF AND GENERAL

1. Although there was some improvement in the staff situation, shortage of Senior Service staff, and especially of experienced and fully qualified officers, remained the critical factor in restricting progress. The demands on the services of the Agricultural Department increase as the pace of development quickens and the available staff falls far short of the requirements of the Region. Of a total establishment for the Region, of sixty-eight Senior Service posts, excluding Specialist Officers and the School, twenty-seven were still unfilled in March 1950. The Empire Cotton Growing Corporation provided further welcome assistance in the form of staff by supplying an experienced Cotton Breeder to work with the Department.

The Groundnut and Cotton Marketing Boards, and the Regional Production Development Board to administer funds provided by the former, were all established in 1949 and are already beginning to have important effects on agricultural development. The first schemes financed by the Regional Production Development Board are already in operation and are described in this report. The Cotton Marketing Board, in addition to providing funds for cotton seed distribution and multiplication and for road development, is financing the establishment of a Cotton Development Team the leader of which started work in the latter part of 1949.

A Mission, appointed by the Secretary of State to investigate the possibilities of a large-scale increase in Sorghum production made a tour of the Region. Visits from a distinguished American Soil Conservationist and an ECA. Mission consisting of three high ranking Agricultural Administrators from the United States were particularly welcome. As a result of the latter, it is hoped that badly needed assistance in the form of specialist staff for specific investigations will be forthcoming through ECA.

It is perhaps necessary to state that while emphasis is now justifiably being placed on special schemes and lines of work intended to secure rapid increases in agricultural productivity, the great many less spectacular but equally important ways of improving agriculture cannot and are not being neglected. Permanent improvements in agriculture and the safeguarding of the land remain essentially dependent on the cumulative effect of numerous agricultural practices, which by themselves often produce quite small returns.

THE SEASON

2. The year 1949 was one of the driest on record in all the Provinces along the northern border. Most of the Region was affected by a long drought which occurred in June and July, exceptions being Plateau, Southern Zaria, Kabba and Ilorin. For the remainder of the wet-season rains were light throughout. Crops were badly affected and amounted to partial failures in the northern parts of Kano, Katsina and Bornu. Guinea-corn was a poor crop, while the more drought resistant millet maintained its yield fairly well. Corn prices remained on a high level throughout the year as shown by the rough average prices of guinea-corn in 1948 and 1949, quoted below for some markets in Zaria, Kano and Sokoto Provinces.

				<i>Three Zaria</i>		<i>Gusau</i>	<i>Kano</i>
				<i>Zaria</i>	<i>District</i>		
				<i>City</i>	<i>Markets</i>		<i>City</i>
				£ s	£ s	£	£
1948 price per ton	..	..	..	12 17	8 17	10	14
1949 price per ton	..	.	..	21 0	15 11	17	18

As a result of the poor season, corn is in short supply generally ; prices continued to rise in the early part of 1950 and are likely to go still higher before harvesting of the next crop starts. Until then there will be hardship in many areas.

Typical rainfall records are shown below :—

NORTHERN BELT

Month	Kano		Samaru, Zaria		Gusau		Bauchi		Maiduguri (Bornu)	
	1949	Average 23 years	1949	Average 26 years	1949	Average 16 years	1949	Average 24 years	1949	Average 17 years
	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>
January ..	—	—	—	—	—	—	—	—	—	—
February ..	—	0.02	—	0.04	—	0.04	—	—	—	0.01
March ..	—	0.09	0.39	0.34	0.51	0.77	—	0.07	—	0.01
April ..	0.80	0.46	0.11	1.28	0.21	0.92	0.44	1.47	—	0.28
May ..	0.51	2.50	4.98	4.98	2.21	3.20	4.76	3.63	2.10	1.82
June ..	2.18	4.31	5.17	6.58	3.83	4.80	4.38	6.25	2.08	2.76
July ..	5.14	7.90	5.52	8.64	6.52	7.67	7.31	9.22	2.12	7.27
August ..	8.14	12.12	15.39	12.05	10.08	12.24	10.95	14.57	7.73	8.70
September ..	3.06	5.34	6.24	8.56	5.40	6.38	4.81	6.84	3.56	4.18
October ..	—	0.57	0.09	1.37	0.12	0.81	0.29	1.67	—	0.73
November ..	—	—	—	0.03	—	—	—	0.09	—	0.01
December ..	—	—	—	—	—	—	—	0.01	—	—
TOTAL ..	19.83	33.31	37.89	43.87	28.88	36.83	32.94	43.82	17.59	25.77

SOUTHERN BELT

Month	Plateau (Riyom)		Bida-Niger		Yandev-Benue		Ilorin	
	1949	Average 8 years	1949	Average 14 years	1949	Average 23 years	1949	Average 45 years
	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>
January ..	—	—	—	—	—	—	—	—
February ..	—	0.43	—	0.29	—	1.06	—	0.90
March ..	0.75	0.89	0.44	1.42	1.02	1.32	1.23	2.08
April ..	2.64	4.06	1.65	2.23	2.09	4.13	2.40	4.12
May ..	9.96	6.66	8.49	5.91	5.79	7.11	8.13	6.62
June ..	6.97	8.35	3.83	7.17	8.20	7.72	8.91	7.67
July ..	9.74	9.47	7.14	7.38	9.65	5.19	3.11	5.31
August ..	10.55	12.14	9.12	8.70	7.50	6.94	9.20	4.96
September ..	4.98	9.73	7.59	10.42	14.38	11.58	10.42	9.75
October ..	1.95	2.91	1.48	2.84	10.85	8.81	7.89	6.90
November ..	—	0.08	—	0.36	0.59	0.61	0.69	1.20
December ..	—	0.10	—	0.01	—	0.18	—	0.27
TOTAL ..	47.54	54.82	39.74	46.73	60.07	54.65	51.98	49.78

SHIKA STOCK FARM

3. The season was not a very good one for crops and grazing at Shika, though ample supplies of hay and silage were produced and no serious feeding difficulties arose. The severe outbreak of trypanosomiasis referred to in last year's report continued and although, with the assistance of the Sleeping Sickness Service, the tsetse position is now under control, the outbreak is not yet entirely over and a small spread of infection by biting flies is still occurring. Trypanosomes were observed in the blood of 25 per cent of the herd and there is little doubt that the actual number infected was much higher. The death rate, directly and indirectly attributable to trypanosomiasis, was high and in addition many animals lost condition badly

so that lactations were adversely affected. All stock up to four years of age have now received the normal calf-hood vaccination for contagious abortion with S.19, and those that have joined the breeding herd have had their second vaccination. All other adults have been vaccinated except a few cows which were in calf when the others were being treated. Although the percentage of abortions was high, being 13.6 per cent of total parturitions, it is reasonably certain that trypanosomiasis was mainly responsible. The last big outbreak of trypanosomiasis in 1944-45 had the same effect and many of the aborters in 1949 were in poor condition with trypanosomes observed in the blood in the majority of cases. Calves did very well and the death rate from scour and pneumonia was very low.

It became possible during the year to relieve by heavy culling the overstocking which had existed for several years due to restrictions on movement on account of contagious abortion. 181 head of stock were issued to other stations during the period under review. The following tables illustrate briefly changes in numbers of stock, with a summary of the stock on hand at 31st March, 1950 :—

STOCK "BALANCE SHEET"

Total stock at 1st January, 1949	..	..	..	..	..	760
Births 1-1-49 to 31-3-50	..	..	..	..	..	176
						936
Disposals and losses 1-1-49 to 31-3-50	..	..	..	..	..	329
						607
Total stock at 31st March, 1950	..	..	..	..	..	<u><u>607</u></u>

Analysis of disposals and losses

Distributed to other Stations	..	..	..	..	..	181
Slaughtered for various reasons	..	..	..	..	..	23
Abortions and still births	..	..	..	..	..	23
Deaths	..	..	..	..	..	102
						329
						<u><u>329</u></u>

Summary of Stock at 31st March, 1950

<i>Class of Animal</i>	<i>Entire Males</i>	<i>Females</i>	<i>Total Breeding Stock</i>
Pure-bred White Fulani	138	282	420
Pure-bred Sokoto	38	103	141
Pure-bred Jot Koran	3	8	11
Cross breeds	7	28	35
	186	421	607
Total	<u><u>186</u></u>	<u><u>421</u></u>	<u><u>607</u></u>

A new daily yield record of 44 $\frac{3}{4}$ lb was set up by a Jot Koran cow, the same animal which established the lactation record of 6,934 lb in 1947. Other Jot Koran cows in the herd are poor milkers. A more important feature is the satisfactory performance of Shika bred cows and heifers, particularly of the White Fulani breed which set up a new record for the herd average for the "period between calves" of 2,505 lb. This beats the 1937 record by a small margin and it is noteworthy that seventeen heifers in their first lactation averaged 2,935 lb with two animals yielding over 4,000 lb. Most of these are daughters of the most outstanding

White Fulani bull yet used at Shika. The following table summarises the results of lactations completed during the year for the "period between calves" for the White Fulani and Sokoto herds :—

				<i>White Fulani Herd</i>				
<i>Lactation No.</i>				<i>No. of Cows</i>	<i>Average Yields in lb</i>	<i>Average days in Milk</i>	<i>Best Lactation in lb</i>	<i>Poorest Lactation in lb</i>
1st ..	..	..	..	17	2,935	315	4,444	309
2nd ..	..	..	..	18	1,961	246	4,118	778
3rd and subsequent	..	..	..	39	2,565	273	4,069	710
Herd Average ..				74	2,505	275		

				<i>Sokoto Herd</i>				
1st ..	..	..	..	7	2,651	306	3,750	624
2nd ..	..	..	..	6	2,643	288	3,690	1,527
3rd and subsequent	..	..	..	14	3,022	290	4,889	1,073
Herd Average ..				27	2,842	294		

In the White Fulani herd there were sixteen lactations of over 3,500 lb and ten in the Sokoto herd. Herd averages of completed lactations for the years 1944-49 are as follows :—

								<i>White Fulani lb</i>	<i>Sokoto lb</i>
1944 ..	..	..	..	..	..	..	..	1,758	1,609
1945 ..	..	..	..	..	..	..	..	2,134	2,313
1946 ..	..	..	..	..	..	..	..	2,336	2,727
1947 ..	..	..	..	..	..	..	..	1,822	2,052
1948 ..	..	..	..	..	..	..	..	2,206	2,363
1949 ..	..	..	..	..	..	..	..	2,505	2,842

The year's lactation records further confirm the capacity of the selected strains of both White Fulani and Sokoto bulls to transmit to their offspring the factors for high milk yield.

Strain two White Fulani bulls are particularly impressive in this respect ; nine of the sixteen cows in the White Fulani herd with lactation yields of over 3,500 lb were got by strain two bulls. Controlled individual mating, which replaced the system of mass mating previously practised, has now been followed for over two years. This has resulted in a temporary rise in the average period between calves to just over fourteen months, which although not an unreasonable figure, should be capable of reduction to nearer twelve months by certain modifications in the routine now being made.

Subsequent to a visit to Shika by Professor Waddington of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh, Dr Robertson of that organisation made a special visit to Shika to examine and photograph the records. These are now being analysed in Edinburgh and it is hoped that the results will be available shortly.

DAUDAWA BEEF HERD

4. The object of work on cattle at Daudawa is to select and multiply a beef type of animal suitable for mixed farmers, with the cows capable of rearing their own quick maturing calves and producing some extra milk. The best beef-type White Fulani animals as culled from

Shika are transferred to the Daudawa herd. The herd was increased from 104 in December 1948, to 177 at the end of March 1950. Culling of breeding animals which do not conform to the set empiric standards was continued and although the herd is still mixed, there is a gradual but marked improvement in the general standard.

CATTLE AT MAIDUGURI AND YOLA FARMS

5. At Maiduguri the policy of testing cows for milking capacity before purchase was continued, and the Shuwa herd was increased to 136. The average for twenty-three lactations completed during 1949 was 2,900 lb the highest being 6,167 lb and the lowest 1,330 lb. These figures are satisfactory at this stage and indicate the promising milking potentialities of the breed. The first bull bred on the farm has now joined the breeding herd, and several farm-bred heifers have started their first lactation.

The herd of thirty of the long horned humpless breed, the Kuri, was transferred to Wulgo on the shores of Lake Chad which is their natural habitat. At Maiduguri the cows proved to be excellent milkers but the animals, and particularly the young stock, did not thrive away from their natural environment and the breed is unsuitable for conditions in central Bornu.

At Yola, where work with the Adamawa breed is in progress the herd was increased by twenty to a total of eighty-seven. Milk yields are still low, and fourteen completed lactations averaged 1,946 lb, the best being 2,743 lb.

CATTLE IN TRYPANOSOMIASIS AREAS

6. Work on the N'dama breed continued at Ilorin Farm, and although the death rate in the N'dama herd was fairly high and the percentage of animals showing trypanosomiasis infection continued to rise, the year's experience confirmed the superior ability of the breed to withstand trypanosomiasis and the other inhibiting factors in such areas. The mortality rate from all causes for the whole stock of 267 animals kept during the year was 19.1 per cent ; comparative figures for N'dama's and other classes were 15.6 per cent and 21.4 per cent respectively. The mortality rate due to trypanosomiasis, was 8 per cent for all animals kept, 3.9 per cent for N'damas (103) and 10.4 per cent for other animals (164). The following table gives a comparison of the incidence and effect of trypanosomiasis between three herds :—

	<i>Percentage infection by trypanosomiasis only</i>			<i>Percentage cases requiring treatment or ending fatally</i>		
	1947	1948	1949	1947	1948	1949
N'dama	14.1	25.7	41.3	11.2	10.8	5.3
Gold Coast	41.7	37.3	41.2	27.8	24.0	10.3
N'dama × Borgawa crosses ..	41.8	26.6	33.3	20.9	31.6	22.8

The number of stock on Ilorin Farm was reduced by seventy-two during 1949, and totalled 145 at the end of the year ; eighty-three animals were transferred elsewhere or sold.

An important factor in the economic value of the N'dama breed is the period between calves and in this respect the breed has not hitherto done well at Ilorin. It is therefore satisfactory to record a reduction in 1949 in the average period between calves to 400 days, compared with 444 days in 1948 and a mean of 443 days for the years 1944-49. At Ilorin calves are normally suckled but rough milk yields are obtained by milking cows one day in seven. Twelve lactation records calculated in this way from N'dama cows gave the poor average of 638 lb with a range of from 108 to 1,128 lb. The best yield was obtained from a N'dama × Borgawa cross which produced 1,810 lb in 250 days.

In Western Kabba seventy kraals of the local Nigerian Shorthorn cattle continued to be maintained and in these the total cattle population was 3,955 at the end of 1949. The general

health of the cattle was good, though some animals did go down to trypanosomiasis. Two pure-bred N'dama bulls from Ilorin were issued as stock bulls during the year ; further issues will be made as soon as suitable animals become available, to implement the policy of grading up the Nigerian Shorthorn stock to N'dama.

At Yandev Farm in Benue Province, the policy of grading up the Nigerian Shorthorn by using N'dama bulls was continued, and at the end of March 1949 there were thirty-nine first cross calves. These have been rather disappointing in the rate of growth up to six months, but after that age there appears to be a distinct improvement in the rate of growth compared with the Nigerian Shorthorn. No trypanosomiasis was recorded in the cross-bred animals.

At Katabu near Kaduna an experiment to test the relative tolerance to trypanosomiasis of Zebus, N'damas and N'dama $\times$ Zebu crosses (F1) is in progress and the final results are awaited with interest. This investigation is being carried out by the West African Institute of Trypanosomiasis Research in co-operation with the Agricultural and Veterinary Departments.

MIXED FARMING

7. Despite the increasing emphasis now being placed on more spectacular forms of agricultural development there has been no lessening of our efforts to encourage mixed farming, which remains the most important line of extension work in all areas where the conditions are suitable. During the 1948-49 season, 1,342 new mixed farmers were established compared with 1,042 in the previous season ; 299 farmers had to be closed down which gives a net increase of 1,043. At the end of 1949 there were 5,763 practising mixed farmers in the Region, distributed on a provincial basis as follows :—

							<i>Number at end 1949</i>	<i>Net increase in 1949</i>
Katsina	..	..	..	..	..	..	2,239	384
Kano	..	..	..	..	..	..	1,458	253
Bauchi	..	..	..	..	..	..	870	214
Sokoto	..	..	..	..	..	..	558	83
Zaria	..	..	..	..	..	..	409	27
Adamawa	..	..	..	..	..	..	81	47
Plateau	..	..	..	..	..	..	57	8
Bornu	..	..	..	..	..	..	56	19
Niger	..	..	..	..	..	..	35	8

Katsina and Kano Provinces still remain the chief centres of mixed farming, but excellent progress continued in Bauchi where there are good prospects of further expansion, particularly in the Katagum, Misau and Gombe Emirates. Interest is rapidly increasing in these areas, and cattle are more easily obtainable than in most other districts.

Though some farmers found difficulty in making full repayments on loans due to the bad season for crops, the poor season served to emphasise the higher general standard of prosperity attained by mixed farmers compared with their fellow farmers. Now that ploughs are in adequate supply, the immediate limiting factor to expansion in areas where there is no pressure on the land is the supply of suitable cattle. Not only are cattle difficult to purchase in many areas but the amount of supervision required for the organisation of their purchase and training, sets a limit to the numbers which can be dealt with. In Kano and Katsina over 3,000 cattle passed through the mixed farming pools in 1949. The high price for fat stock encouraged the cattle fattening industry which is a desirable development, but it also encouraged mixed farmers to sell their cattle after only a year's use. This restricts the number of new entrants who can be set up so that Kano Native Administration had to make a rule whereby farmers still in debt will retain their work cattle for two to three years. Efforts to encourage farmers to breed

their own replacements or to purchase their own cattle where this is possible were continued, but progress so far in these directions is slow. With the greater number of ploughs now in use, it has been necessary to devote even more time to persuading mixed farmers to adopt sound farming practices and to prevent the indiscriminate cultivation of land without adequate manuring.

CATTLE AUCTION SALES

8. The Sunday auction of mixed farmers' and stall feeders' cattle operated at Kano in collaboration with the Veterinary Department, continued to be popular although, mainly as a result of pleuro-pneumonia restrictions, there was a reduction in the number sold in 1949 to 600 with a value of £8,252, compared with 654 valued at £9,525 in 1948. The quality of the cattle which came from Azare in Bauchi Province was particularly good and farmers there took great pains to finish off their cattle well. Gumel farmers also did very well and a number of feeders there worked without the assistance of the Native Administrations scheme for the provision of credit. The table below gives details of numbers, quality and prices since 1946.

<i>Grade</i>				<i>No. of Cattle</i>			<i>Average Price per lb</i>		
				1946	1947	1948	1946	1947	1948
Very Fat	..	..	..	6	18	49	3.30d	4.28d	4.83d
Fat	..	..	..	133	205	89	3.04d	3.77d	4.39d
Forward Stores	..	..	..	164	267	516	2.86d	3.45d	3.55d
Stores	..	..	..	42	46	—	2.17d	3.21d	—

Prices continue to show a steady upward trend, though prices for the top grades are enhanced by the priority given by the Railway for fat stock in the allocation of wagons for railing to Lagos.

The new cattle market with special railing facilities at Funtua in Katsina Province, to which reference was made in last year's report, is nearing completion and will shortly be in operation.

DAIRYING

9. Difficulties connected with the supply of cows, inducing farmers to improve the standard of management, pressure on the land and grazing, and the scarcity and high cost of fodder, all continue to restrict progress in the schemes for increasing supplies of milk and milk products to Kano City, described in previous reports. Dairy farmers established with advances from the Native Administration, totalled seventy-seven at the end of 1949 compared with sixty-one in January 1949, but with a monthly average of some twenty-six cows in milk sales during the year amounted to only 1,275 gallons. With 907 gallons from the Government owned herd and 881 gallons from Fulani cattle owners, a total of 3,063 gallons of fresh milk was distributed to Kano consumers in 1949. Total sales in 1949 from the Kano Government dairy, which derives supplies mainly from Dabi and Birniwa, were valued at £1,282 and included 2,380 lb cream, 4,488 lb butter, 283 lb cheese and 6,290 gallons skim milk. All equipment for the new Kano dairy has now arrived and is being installed, but it is not anticipated that the necessary electric power will be available until April 1951. Two Native Administration dairies at Okene and Kabba catering for milk produced by kraaled Nigerian Shorthorn cattle continued to function. Some 4,320 gallons of milk were purchased and production of cream and butter totalled 4,130 lb and 2,125 lb respectively. Zaria dairy disposed of 6,138 gallons of milk, 4,111 gallons of skim milk and 2,125 lb of butter during the year, and 11,192 gallons of milk were sold from Shika.

PIGS

10. In order to meet the demand for bacon pigs, which private enterprise unfortunately cannot yet fulfil, it was necessary to maintain piggeries directly operated by the department at Minna, Daudawa, Samaru, Shika and Bauchi, and from these a total of 3,848 pigs to the

value of £39,000 were railed to Lagos during the period under review. The departmental piggeries were operated on a quasi-commercial basis, and during the period 1st April, 1949 to 31st March, 1950 the total profit made amounted to nearly £6,500. The pigs, which were mainly of the large white breed, did well and no serious disease troubles were experienced. Of the output of departmental piggeries, 577 were purchased as weaners from peasant breeders in Zaria and Bauchi Provinces to whom exotic breeding stock had been issued. Efforts to encourage African enterprise in the pig fattening industry which have been made over the last few years, are so far meeting with little success, and many African private piggeries have failed, mainly due to shortcomings in feeding and management. In the fifteen months up to the end of March, 3,168 pigs were railed to Lagos from private piggeries operating under the aegis of the Department, but of these, 2,420 came from a piggery in Kano which is not African owned. By the end of March only four African owned piggeries were still functioning. One of the chief difficulties facing the pig industry is the limited supplies of surplus corn at present available, especially in poor seasons, and its high price. No appreciable expansion is possible until an adequate quantity of corn, surplus to requirements for human food, can be produced. The high price of corn and rising labour costs led private piggeries to press for a higher price for pigs, and in July 1949, buyers in Lagos had to raise the price from 10d per lb live weight to 1s. The average cost of production per lb live weight at Shika and Minna departmental piggeries in the financial year 1949-50 was 9.35d per lb and although the accounts for that period do not fully reflect more recent rises in costs, these should add only a little to that figure.

Shika piggery, which produces pure-bred breeding stock for piggeries throughout Nigeria, distributed 115 animals to various breeders during the period.

POULTRY

11. A poultry farm, as a sub-station to the central poultry farm at Oyo in the Western Region, is in process of establishment at Riyom in Plateau Province, but progress was restricted by delays in obtaining breeding stock and materials on indent, and by the end of March 1950, the sub-station was just beginning to operate. Disease presents difficult problems in the development of poultry keeping but small flocks of Rhode Island Red and grade birds are maintained at a number of departmental farms to supply improved stock and eggs for local distribution. Some 230 breeding stock and 2,600 eggs for hatching were distributed during the period. There is a particularly keen demand for improved breeding stock from farmers in the Gusau area, where the effect on local stocks of poultry of previous issues of breeding stock and eggs for hatching is becoming increasingly marked. At Ilorin a number of villages have been selected where the people are willing to co-operate in a village poultry improvement scheme, involving the disposal of all native cockerels prior to the free issue of Rhode Island Reds and acceptance of advice on management. The Veterinary Department has arranged to inoculate at six months intervals against the more virulent diseases. Thirty-four cockerels have been issued to these villages and although there have been some casualties, villagers are maintaining interest and co-operation so far.

AGRICULTURAL SHOWS

12. Successful agricultural shows were held in the latter part of 1949 and early 1950 at Daudawa, Kafinsoli, Daura, Gombe, Misau, Bauchi, Vom, Anchau and Maru. These shows are rapidly growing in popularity and create great enthusiasm. Competition particularly among cattle exhibitors was keen and the standard of exhibits was generally very good.

FODDERS AND PASTURES

13. The encouragement among mixed farmers and stock farmers generally of the production and conservation of fodders in adequate quantities for dry season feeding is an important line of extension work in which gradual but slow progress is being made. In

many areas the peasant farmer well appreciates the value of fodder and normally conserves all suitable crop residues for this purpose, and the more advanced farmers also make hay from bush grass. Experiments and demonstrations were further extended on departmental farms where various crops including mucuna, sweet sorghum, sunflower and soya bean, as well as grass, natural and specially established, were ensiled or made into good hay. The exploitation of grass in these ways is of more immediate practical application to farmers, and experience has confirmed that silage offers promising possibilities. Excellent results have been obtained with simple and cheap methods of ensilage which farmers should be able to practise easily. At Daudawa some 400 tons of very good stack silage were produced, mainly from bush grass at a cost of about 10s per ton. Although by this method there is a fairly heavy wastage, it is cheap and easy and can be carried out by any group of farmers. The waste material can be utilised as manure.

Agronomic investigations on fodders and pastures were continued and extended as far as the staff position would allow, but pasture research for which there is an urgent need and on which the eventual development of the livestock industry and mixed farming is to a high degree dependent, is still very much in the preliminary stage. The collection and observation of indigenous grass species continued and ninety-seven grass specimens were sent from Ilorin to the Royal Botanic Gardens Kew for identification. Further trials of methods of establishment of promising species were made and observation plots were commenced to study the behaviour of grasses and certain legumes in simple mixtures. The most comprehensive experimental programme is in progress at Ilorin, where investigations include the effect of burning, responses to organic and artificial fertilisers, observations on various grass seed mixtures, the effect of frequency of cutting, and palatability observations. Increased yields of over 60 per cent resulted from the application of ammonium sulphate and superphosphate to Gamba (*Andropogon Guyanus*) at the rate of 100 and 200 lb per acre respectively. With single fertilisers, nitrogen produced the highest responses, and potash did not give any significant increases in yield. The following yield figures in an experiment which has been in progress since 1944 to ascertain the effect of annual dressings of FYM. at various rates on natural pasture, are of interest :—

Period					Total yield of fresh grass in lb per acre			
					No manure	2 tons FYM.	4 tons FYM.	8 tons FYM.
1944-48 (inclusive)	..	..	..	..	36,270	49,130	67,405	94,060
1949	..	..	..	..	10,550	14,910	23,200	38,320

A small plot of Guatemala grass established at Shika and heavily irrigated with liquid manure produced green fodder equivalent to 135 tons per acre in a seven month period ; elephant grass under the same conditions yielded at the rate of sixty tons per acre over nine months.

Investigations to obtain data on the stock carrying capacity of natural pastures are in progress at Shika, Riyom, Ilorin and Yola but it is yet too early to report results. Still more attention is being given in the general experimental programme to studies of the use and effects of grass fallows which must play an important part in the maintenance of soil fertility in improved farming systems. At Yandev where experimental work on fallows is furthest advanced, Gamba (*Andropogon Gayanus*) has given the best results, and the indications are that in that area a three-year Gamba fallow is required to maintain fertility with the Tiv rotation.

COMPOST

14. Propaganda and demonstrations to encourage conservation and use on the land of all forms of household refuse and crop residues were intensified, especially in areas where there is pressure on the land and the people are not already manure conscious. Some success is gradually being achieved though progress generally is still very slow. The best results

were obtained in Eastern Sokoto and in Bida Emirate where the making and use of compost is slowly spreading. Extensive demonstrations of the production and value of compost were carried out in Benue Province. The compost was made in the farmers' own compounds and applied to their farms. The average yield figures recorded from all of these demonstration plots are as follows :—

	<i>Guinea-corn</i> lb	<i>Millet</i> lb
Average yield per acre with a dressing of 4 to 5 tons compost		
per acre.	673	725
Average yield per acre without compost	270	427

Despite these convincing demonstrations, only a few farmers have so far themselves adopted the practice, though interest is increasing.

ARTIFICIAL FERTILISERS

15. Following comprehensive experimental work on artificial fertilisers which is still in progress, and the spectacular and highly economic responses in yields of all the major crops to comparatively small placement dressings of superphosphate described in previous reports, the Regional Production Development Board agreed to finance a major scheme to encourage the widespread use of superphosphate in the shortest possible time. This scheme involves the organisation of planned free distribution in selected districts in the groundnut producing areas, of 1,000 tons superphosphate per annum for several years. The object is to convince farmers of the value of the fertiliser by propaganda and visual demonstration on their own or neighbours' farms to the point where its large scale commercial use can be attained. Commercial supplies will be organised to follow the demonstration stage quickly in each area. Special teams have been formed in six Provinces, the members of which attended a three days course at Samaru in February 1950, and a Senior Administrative Officer was given executive responsibility for the organisation of the scheme. Because of the danger which attends the use of neat fertiliser powders in unskilled hands, particularly with groundnuts, and the need for easy and quick methods of placement application especially in the early stages of development, it was necessary to obtain superphosphate in the form of pellets or large granules. This led to unexpected difficulties in production and supply at an economic cost, but eventually 1,000 tons of superphosphate in suitable granular form were shipped in March 1950. This cost £26 10s per ton f.o.b. Liverpool but there are prospects of a substantial reduction in price for future consignments; further investigation and experience are likely to lead to the use of cheaper forms of superphosphate. By the end of March 1950, good progress had been made with the organisation and farmers were showing keen interest.

The total cost of the scheme is likely to be of the order of a quarter of a million pounds, but no other single measure of agricultural improvement offers such an excellent opportunity of a really rapid and substantial economic increase in the productivity of the Region. The effect on groundnut and staple food grain production should be of equal importance, for it can be predicted with confidence that over the greater part of the Region, the application of 60 lb superphosphate per acre will lead to increases of from 200-400 lb per acre in both groundnuts and grain. In addition to the effect in the year of application, superphosphate leaves a substantial residual effect which has been shown to persist up to four years. The target for the present scheme within five years is the commercial distribution of 16,000 tons of superphosphate annually. This is sufficient to give a biennial dressing to 1,200,000 acres, roughly the area at present required to produce 300,000 tons of groundnuts, about a normal good export surplus. This of course represents only a small part of the scope in the Region for the economic use of superphosphate on both food and export crops. In practice there will be considerable variation in manuring systems used by farmers, but as an illustration of

the order of increased productivity to be anticipated, it has been conservatively calculated that if 16,000 tons of superphosphate is applied to the corn crop and the residual effect taken on a following groundnut crop, corn production should be increased by 60,000 tons and groundnut production by 30,000 tons annually.

Demonstrations and trials in co-operation with some 400 farmers were carried out at various centres in 1949, and although in northern areas the exceptionally dry season prevented full responses to superphosphate, all treated plots produced substantially increased yields and farmers were duly impressed. The results of the season's experimental work are reported on in the Chemistry Section.

EXPERIMENTAL AND DEMONSTRATION FARMS

16. Studies of crop and animal husbandry problems proceeded and field experimentation was co-ordinated and expanded within the limits of staff resources at eighteen departmental farms and farm centres ; special attention was given to the initiation of new investigations into problems connected with the maintenance of soil fertility and land utilisation. The sections of this report prepared by the Assistant Director (Experiments) and Specialist Officers deal with this part of the work of the Department, but unfortunately, owing to the staff situation and pressure of work it has not yet been possible to publish a technical bulletin giving details. Forty-six experimental family holdings and thirty-four demonstration unit holdings were maintained throughout the Region ; the former provide valuable data and records and the latter serve a useful purpose in demonstrating a wide range of good farming methods. Detailed records from these farms are kept and the following analysis of farm and family budgets for eight farms in Kano Province may be of interest. It is apparent from these records that the keeping of cattle either for beef or milk as well as for work and manure making is a useful adjunct in maintaining a profitable holding.

<i>Description of Unit Farm</i>	<i>Expenditure on crops</i>	<i>Expenditure on stock</i>	<i>Revenue from crops</i>	<i>Revenue and appreciation from stock</i>	<i>Total Profit (Farmer's Income)</i>
	£ s d	£ s d	£ s d	£ s d	£ s d
<i>Kano No. 1</i>					
4½ acres, 1 bull, 1 cow ..	3 2 10	22 18 3	11 1 11	30 2 2	15 3 0
<i>Kano No. 2</i>					
5½ acres, 2 cows	5 15 4	20 18 3	19 15 7	26 13 6	19 15 6
<i>Kano No. 3</i>					
4½ acres, 1 cow, 1 bull ..	2 19 8	24 11 5	10 10 4	31 6 0	14 5 3
<i>Kano No. 4</i>					
6½ acres, 2 bulls and ploughs	3 10 0	28 12 5	18 6 4	28 5 0	14 8 11
<i>Kano No. 5</i>					
3½ acres, 1 cow	1 12 4	11 7 8	7 4 5	24 8 0	18 12 5
<i>Kazaure Demonstration</i>					
12 acres, 2 bulls, 1 cow, 2 calves and ploughs ..	7 16 11	17 18 7	47 9 9	19 17 6	42 1 9
<i>Gumel Demonstration</i>					
12 acres, 2 bulls, 1 cow, 1 bull calf	3 6 11	12 12 0	32 19 6	18 13 4	35 13 11
<i>Mallam Maduri Demonstration</i>					
12 acres, 2 bulls, 1 cow, 2 calves	1 7 9	—	23 10 2	3 15 0	27 17 5

AGRICULTURAL TRAINING CENTRES

17. Eighty-seven ex-servicemen completed the course of training in mixed farming at the Kafinsoli centre during 1949-50 financial year. Of the trainees now coming forward, however, comparatively few are really keen on or suitable for farming, and results are

deteriorating. For this reason it has been decided to discontinue the course. The Katsina Native Administration training centre which provides a practical course in agriculture for ex-elementary school boys continues to serve a useful function. A further twenty-seven boys completed the course and went back to their homes as potential mixed farmers. At the Riyom Farm Training Centre financed by Jos Native Administration, the second batch of students completed their one year course and were set up on their own. Eleven Birom students have nearly completed the third course. There is no shortage of applicants for the course but although more supervision of training has recently become possible, insufficient attention can yet be given to following up the farming activities of ex-students. The number of ex-students showing signs of making a success of their farming ventures is, however, increasing.

The report on the School of Agriculture, Samaru, is in a separate section.

SOIL CONSERVATION

18. Soil conservation measures continued to be applied with good results on farms under departmental control, including demonstration farms. The main terracing system is nearing completion at Shika and was completed at Maigana where a marked improvement in vegetation is already apparent. With increasing labour costs, terracing by hand labour is becoming even more expensive and at other departmental farms only the more dangerous areas are now being protected in this way. On the experimental tractor unit farms terracing was kept to a minimum, and contour cultivation with adequate protective grass and bush strips constituted the main protective measures. Experimental work on the mechanisation of anti-erosion measures involving earth works had to be limited to small-scale preliminary trials.

On the Plateau, the experimental and demonstrational protective schemes were maintained at Gyel and Vom Turu. The Gyel area continued to stand up well ; there was no water logging and little maintenance was needed though local farmers failed to carry out necessary minor repairs to the gully blocks, which had to be done by paid labour. Protective measures on the Vom Turu area were completed but considerable trouble was experienced with the system in its first year. In part this is due to the gravelly nature of the soil and the time taken for new terraces to settle, but the main trouble is the result of modifications in the system which had to be made to accord with the antipathies and religious customs of the local farmers. A single main drain had to be substituted for water meadows and large areas of land known as "tsafe" had to be left unprotected owing to religious objections. Repairs eventually proved effective but will have to be completed early next rains when further modifications will be necessary. The last two years' experience at Gyel and Vom Turu has demonstrated that though the systems under trial can be made effective, they cannot be made immediately practicable under existing conditions and until the people can be educated to accept the necessary changes in customs and give their willing co-operation. We must therefore experiment in an attempt to evolve simpler and cheaper, even though less efficient, systems which the people will accept and can carry out themselves with a minimum of assistance. Arrangements were made for the Officer-in-charge of Soil Conservation in the Region to move his headquarters to the Jos area, where, in addition to a study of the Vom Turu and Gyel systems during the rains, and the collection of run off data, investigations, on the lines indicated above are required.

The terracing system was completed in October 1949 on a demonstration of soil conservation on poor grazing land at Dambarta in Kano Province, where further improvement by rotational cultivation and grazing also forms an important part of the scheme. Approximately 1,000 acres of grazing and farm land have been protected and the people are impressed with the results achieved so far. A change over from grazing to crop cultivation in the

southern part of the area is being made in the 1950 season, and individual holdings for cultivation were demarcated. Another soil conservation demonstration on a substantial scale, financed by the Native Administration, was started in March 1950 at Sumaila in Kano Province after an initial survey of a badly eroded area to the east of the town.

In other Provinces, although there was no relaxation in efforts to demonstrate and encourage the adoption of soil conservation measures, and particularly the more simple practices, only limited progress can yet be reported. There is, however, developing a more general appreciation in most quarters, including Native Administrations, of the dangers of erosion and soil degradation. Sokoto Native Administration approved rules for simple soil conservation measures such as contour ridging on hillsides, the establishment of grass strips on farm boundaries, prohibition of farming near steep river banks and early burning, but attempts to enforce them have not yet met with a great deal of success. In one area near Gusau, where a group of some fifty farmers have adopted under close supervision, contour ridging and other simple protective measures together with the use of manure and compost, a visible improvement in conditions and crops is reported.

IRRIGATION

19. With the welcome recruitment of two experienced Irrigation Engineers during the period under review, the prospects for development of irrigation greatly improved. But irrigation work is of a highly technical nature requiring specially trained staff at all levels so that until junior staff can be trained, progress must inevitably be slow. The Public Works and Survey Departments each provided a member of the staff to assist in training ; but in the absence of other training facilities the Irrigation Engineers have had to devote a disproportionate amount of their time to the technical training of junior staff instead of upon the planning and execution of irrigation works. The lack of detailed survey maps and of hydrological data were other major handicaps. In the face of these difficulties the progress made can be regarded as satisfactory.

In Niger Province the survey of the first pilot project situated in the Wuya-Edozhigi area was completed and detailed plans for a scheme estimated to cost about £41,000 were prepared. Construction work on a limited scale with hand labour was started at the end of January 1950 and will be stepped up in November when it is hoped to have earth-moving machinery available. The total area affected by the scheme amounts to some 2,500 acres, with a possible extension to about 3,000 acres. Approximately 1,500 acres of land on which rice cannot be cultivated at present will be made available for rice ; sufficient water should be available for the dry-season irrigation of up to 1,000 acres. Survey work and the collection of hydrological data started in June 1949 in an area in the plain of the Gbako River near Badeggi, where a scheme up to ten times the size of that at Idozhigi may be possible. Much detailed preliminary work which is still in progress will, however, be required before plans for a scheme can be prepared. The Irrigation Engineer also provided advice and assistance in connection with the inception and improvement of minor native irrigation works in Niger Province.

One of the new Irrigation Engineers was posted to Sokoto Province in June 1949, where he started by organising a training school for junior staff with the assistance of the Survey Department ; this provides a sequence of six months courses for twelve trainees. It soon became evident that the prospects for major irrigation schemes in Sokoto Province are not favourable, but there is scope for smaller schemes, many on a village basis, which can make a substantial contribution to the agricultural productivity and prosperity of the area. By the end of March 1950, the Irrigation Engineer had carried out some thirty reconnaissances in order to determine the types of schemes most likely to give satisfactory results. A programme was then prepared for eleven investigations for survey during 1950-51 when the products of

the training school become available. The type of work covered by this programme includes drainage, diversion, lake exploitation, flood protection, and storage schemes. A start was made with the collection of hydrological data during the 1949 rains, and this essential work will be extended in 1950.

During February and March 1950 the Irrigation Engineer carried out a series of preliminary reconnaissances in Bornu, Kano, Katsina and Benue Provinces, and apart from the provision of useful information on the possibilities for future development of small-scale projects in these areas, his reconnaissance of Lake Chad disclosed the possibility of a scheme on a really large scale on the shores of the lake, which appears at first sight to be technically very promising.

The encouragement and improvement of minor irrigation works and of dry-season farming continued to be important features of extension work in all suitable areas. An interesting development is in progress near Kafinsoli, where 33 acres of a hitherto unused fadama were broken in by tractor ploughing for dry-season cultivation, and the area was laid out in $\frac{1}{4}$ acre plots with a shallow well and *shadowuf* on each. All the work was done by the people themselves, and although only about a quarter of the farms were fully exploited in the 1949-50, the success of these has aroused keen interest.

MECHANISATION

20. Delays in delivery of tractors, and especially of implements and equipment, as well as in clearing and railing from Lagos together with the shortage of expert staff during the farming season, greatly restricted progress in experimental work on the mechanisation of upland crops. However, preliminary clearing and stumping and some mechanical cultivation, were carried out at eight experimental tractor unit farms which are sited to cover varying agricultural conditions in the Region and have been established for the purpose of investigating all the problems connected with the evolution of an economic system of mechanised farming suited to the area in which the unit is situated. A total area of about 1,000 acres was cleared and stumped by hand labour. Labour costs of clearing and stumping were high, varying from just over £2 per acre under easy conditions to £6 10s per acre and averaging about £5 10s. The lack of adequate supervision affected clearing costs but with increasing labour rates it is unlikely that any great reduction will be possible in the cost of clearing and stumping by hand where direct labour has to be employed. A total of some 570 acres on the tractor unit farms was broken in by the plough, and crops were grown on about 500 acres. It was late in the season before any crop could be planted and the general level of yields was very low. Tractors in use comprised Fowler Marshall, Field Marshall, Fordson and Ferguson but suitable implements, including unitary equipment did not arrive until very late in the season and a great deal of improvisation was necessary. It is therefore not yet possible to report on the performance of tractors and implements or to provide useful figures for operating costs. Wheel slip even with water ballasting of tyres was one of the most common troubles experienced during the rains. Despite the disappointing progress made in accumulating factual data much valuable preliminary experience and knowledge has been gained. It is already evident, however, that the problems connected with mechanisation of upland crops on an economic basis are many and formidable and that it would be unwise to be too optimistic concerning the scope for development in this direction.

Tractors were also used on four departmental farms and on land which had previously been regularly cultivated conditions were more favourable. At Daudawa 56 acres of land were ridged for cotton and subsequently cultivated once and earthed up. Operating costs per acre for fuel, oil, and driver only, worked out as follows :—

							s	d
Breaking down old ridges	..	..	..	..	..	..	2	7
Ridging	..	..	..	..	..	..	2	2
After cultivation	..	..	..	..	..	..	3	8

The prospects for early and large scale economic development of mechanised cultivation of rice and other crops on the fertile "fadamas" of river plains and low lying areas are more promising. Following good results with preliminary trials at Sokoto carried out in 1948 and early 1949, the Regional Production Development Board agreed to provide the capital equipment required for a major scheme of rice cultivation to be operated by Sokoto Native Administration in the Sokoto and Rima River valley which pass through Birnin Kebbi, Argungu and Sokoto Emirates. Ploughing commenced in November 1949 with three tractor units and by the end of March 1950, eight tractors, seven Fowler Marshall crawlers and one Massey Harris, were available. Numerous difficulties were experienced in setting up the organisation required, collecting supervisory staff, training operators, and in assembling and transporting tractors and implements to the site far removed from railhead ; but by the end of March 1950, an area of 1,083 acres had been ploughed. A system of incentive pay for drivers proved very successful and raised the daily acreage per driver and tractor unit from about two to between four and six acres.

The ploughing target for the season, of 2,200 acres, should be achieved before the middle of June when rain may be expected to put a stop to the work.

Ploughs used consisted of the Ramsome Dragoon disc plough and the Massey Harris No. 504 disc plough ; Ramsome Pro-Consul and Marquis mould board ploughs were also tried, but the latter proved too heavy for the tractors and the former too light for the job. Although under the easier conditions in the fadamas the disc ploughs did a good job, the tractors were always operating near the maximum of their capacity and under the more severe conditions results were unsatisfactory. An unexpected variety of soils was encountered, ranging from heavy clays covered with matted grass, to very hard baked sandy clays which proved the most troublesome. Unfortunately under these conditions some of the ploughing was very unsatisfactory and only about half the area ploughed was really well done. This experience has amply demonstrated that both tractors and equipment now being tried are much too light for the conditions, at any rate for the initial breaking in stage, and that much heavier equipment is needed for this stage. Plans to obtain heavy equipment for next season's work are already being made, but it will be necessary to obtain this from the United States as suitable tractors and equipment are not available elsewhere. Although admittedly working under much more severe conditions than those for which it was designed, breakages in the Ramsome's Dragoon disc plough were exceptionally heavy, the main trouble being with land and furrow wheel bearings.

The scheme is being operated on a quasi-commercial basis, and its primary object is to extend the cultivation of rice and bring in to cultivation substantial areas which have hitherto been left untouched by reason of the heavy labour involved in breaking in by hand. The initial cultivation is the main limiting factor so that mechanisation is at present confined to ploughing. For the 1949-50 season an arbitrary charge of 35s per acre is being made for ploughing ; this was decided in consultation with the Native Authorities and the people, and is well below the cost of hiring labour for hand cultivation which is a fairly common practice. Complete costings figures are not yet available, but despite the season's many difficulties and teething troubles it is believed that inclusive costs will be well below that figure. An experienced Agricultural Development Officer was given charge of the project in January 1950, and other Senior Service Staff consisted of a Mechanic Demonstrator and two Development Officers, one on fadama reconnaissance survey and layout and the other on the accounting side. The project was enthusiastically welcomed both by the Native Administrations and the people in the three Emirates, and although there has been a certain amount of disappointment at the poor standard of some of the ploughing, there has been little loss of interest and enthusiasm.

If suitable heavy equipment can be obtained in time it is hoped to tackle up to 25,000 acres in the 1950-51 season.

The Regional Production Development Board also provided the capital equipment for a similar scheme at Shemankar in Shendam Division where a substantial area of potentially suitable land exists. This project will start on a smaller scale with three tractor units only, and by the end of March two of these had arrived on the site ready to start ploughing. It is planned to carry out preliminary trials in the 1950 season at Badeggi in Bida Division.

The recently organised engineering branch of the Department has been expanded, and although retarded by delays in the arrival of technical staff, progress was made in building up a suitable organisation. Further expansion of this branch will be necessary to meet the increasing demands made upon it, not only for the maintenance and repair of machines, but for the testing of new types of machinery, the training of tractor operators and the development of techniques to suit the very varied conditions which obtain in the Region. During the year the engineering branch became responsible for the maintenance and operation of an agricultural equipment pool financed by the Regional Production Development Board. Tractors, implements and other machinery to a total value of nearly £25,000 were ordered and by the end of March 1950, a considerable part of this order including thirteen tractors had arrived at Lagos or Samaru. In addition fifteen new tractors with unitary and other equipment ordered departmentally for experimental work had arrived. Training of tractor operators and mechanics proceeded at Samaru and, during the period under review, a total of sixty tractor operators received training, of whom thirty-eight passed a test. Workshop facilities at Samaru are being expanded.

MINES RECLAMATION—PLATEAU PROVINCE

21. The problems connected with the reclamation of land destroyed by tin mining operations, to which reference was made in last year's report, continued to be well to the fore in Plateau Province. Although only slow progress can yet be recorded some 100 acres are now under experimental treatments, and valuable information is being acquired. Good covers of grass and legumes for regeneration by fallow can be established with applications of 20 to 40 tons compost per acre, and efforts are being made to increase available compost supplies by establishing night-soil composting in the bigger mining camps in the Jos-Bukuru area. Various wild legumes have been successfully established as restorative covers, and *Tephrosia Vogellii* and Pigeon Pea are among the more promising. Artificial fertilisers alone, or even in conjunction with compost have produced disappointing results. Trees successfully established on drag line dumps at Bukuru and Barakin Ladi show that areas which it is impracticable to level can best be treated by afforestation, but unfortunately there is a strong prejudice against this by Birom farmers. An area of small hand dumps was levelled by a Fowler Marshall tractor pulling a land leveller, but owing to the unsuitability of this equipment costs amounted to the high figure of £16 per acre. At the close of the period under review, suitable mechanical equipment had arrived including two D.6 tractors with bulldozing equipment, and the staff position had improved by the recruitment of a Mines Reclamation Officer with experience of reclamation of open cast mine workings in the United Kingdom. Substantial progress can now be anticipated in implementing plans for levelling wherever practicable and establishing regenerative covers with the aid of compost.

LAND SETTLEMENT AND PLANNED FARMING

22. Farmers in the Daudawa settlements who concentrate on cotton as their cash crop had a prosperous year, and repayments of advances presented no difficulties. Special credit facilities are provided for the settlers by the Native Administration but experience has shown that these tend to encourage the inherent improvidence of the farmers. They are therefore

gradually being placed on the same basis as other mixed farmers in this respect. The general standard of farming in the settlements continued to be satisfactory.

Excellent progress has been made in the settlement scheme in Shendam Division, and this was extended in 1949 by the formation of a second village at Maibudi containing seventy families of the Hill Yergam tribe, making a total of 120 families already settled. Crop yields were satisfactory and settlers who put in much hard work in clearing operations appeared to be well satisfied. Farmers took considerable interest in a demonstration farm which proved very successful. Reconnaissance to select sites for further groups continued, and the provision of roads and water supplies proceeded. Wells have so far proved difficult, but two storage dams were constructed and reconnaissance has disclosed the presence of three lakes which can be utilised.

The principle of self-help is an important feature of this scheme, and material assistance to the settlers is largely confined to the provision of access roads and water supplies and the demarcation and laying out of the land and housing sites. Transport to the site was provided, and Hill Yergam settlers moved in with all their possessions and sufficient food to carry them through the harvest. It is recognised, however, that it may be necessary in future to assist with subsistence until the first crops can be reaped. The principles of sound land use are being followed in laying out settlement sites and individual holdings. Farm land is laid out with ample provision for grazing and fuel requirements. No attempt is being made to introduce revolutionary changes in farming practices right from the start, though family holdings of a size capable of full development later are allocated, and precautions are taken to ensure that the basic rules of good farming are followed. Further improvements in agricultural practice will follow in the next stage as the organisation of the settlements develops. This is believed to be sound policy and a practical approach to the problems of organised settlement of really large numbers by a limited supervisory staff. The scheme has been developed by a closely knit team consisting of the District Officer, the Agricultural Officer and a Development Officer, and the pattern has been laid for large-scale expansion for which efforts to recruit more staff are now in progress. An area of some 600 square miles of almost totally uninhabited land, much of which is believed to contain fertile soil, is available for settlement in Shendam.

Some success has at last been achieved in persuading the Birom to move from their over populated and deteriorating land on the Plateau. Early in March 1949, some twenty Birom young men from Zawan village asked for permission and assistance in settling in Jema'a Division. Although the rains were approaching, a site on the Jos-Wamba road was quickly selected by the Agricultural Officer, the village layout and farms demarcated and the settlers and their families moved in. The general principles of the scheme are the same as those followed in Shendam. The settlers worked hard and retained their enthusiasm despite disappointing crop yields due to late planting on new land, consequent on the late start. Reconnaissance of the area is proceeding and several further settlement sites have been demarcated ready for occupation, but only another nineteen volunteer settlers had actually moved in by the end of March 1950.

Government and Native Administration Agricultural Staff assisted with a Native Administration settlement project near Kontagora, where groups of mixed farmers are being established on new land. This is still in the development stage and it is too early to assess results, though experience so far indicates that the amount of supervision required to secure reasonable efficiency on projects such as this, is formidable. Due to various difficulties the general standard of the first year's farming of the twenty settlers in the first hamlet was low and crop yields were poor.

GROUNDNUTS

23. Comparative tonnages on a provincial basis purchased for export in the seasons 1948-49 and 1949-50 are as follows :—

							1949-50	1948-49
Kano	..	..	..	..	..	..	107,840	179,056
Katsina	..	..	..	..	..	..	16,842	45,050
Sokoto	..	..	..	..	..	..	20,461	42,044
Bornu	..	..	..	..	..	..	16,719	27,892
Bauchi	..	..	..	..	..	..	14,001	14,446
Zaria	..	..	..	..	..	..	2,231	5,331
Adamawa	..	..	..	..	..	..	7,998	9,076
Other Provinces	..	..	..	..	..	..	2,026	5,177
							<u>188,118</u>	<u>328,072</u>

Poor yields, due to the unfavourable weather conditions, were responsible for the low purchase for export. In the main areas of production the crop was planted two or three weeks later than usual and the growing season was abnormally short due to poor rains in September and October. A stem borer was active in Kano and Katsina Provinces and caused considerable damage. In parts of Kano Province some farmers harvested their groundnuts for the tops only as it was not worth while picking the nuts. The distribution of rainfall was more favourable in the producing areas of Bauchi and Adamawa Provinces, where purchases more closely approximate last year's figures. In some areas such as the Gusau area of Sokoto Province the late onset of the rains tended to cause a reduction in the acreage under groundnuts in favour of cotton. As a result of the poor crop and low threshing percentage, together with the increased quantities consumed locally owing to the general scarcity of grain, seed supplies for the 1950 crop are likely to be difficult. Prices for seed rose steeply in March. The poor crop has, however, had one benefit in that it has given the Railway a chance to clear all but a few thousand tons of the 1948-49 crop and should enable the 1950-51 crop to be shipped without storage.

Demonstration plots to show the advantage of closer spacing of seed have been laid down in twenty-five districts of Kano Province since 1943. Comparative figures for yields in lb shelled nuts per acre are as follows :—

						Average 1949	Six years' Average 1943-48
Local spacing	..	..	..	..	..	388	512
Close spacing	..	..	..	..	..	458	612

Distribution of seed of improved varieties of groundnuts continued. The variety MD.351, produced by the Botanist, has given consistently good results in areas in Kano where ridging is practised, and plans have been made for large-scale multiplication of this variety in 1950 to accelerate its distribution.

ALLEN COTTON

24. There was an increase of 1,108 tons in Allen Cotton seed distributed for planting in 1949, with a total of 7,567 tons compared with 6,468 tons in 1948. Comparative figures for distribution on a provincial basis are as follows :—

						Seed distribution in tons		
						1947	1948	1949
Katsina	..	..	..	..	..	1,947	2,442	2,666
Sokoto	..	..	..	..	..	1,536	1,727	2,095

Zaria	..	..	..	..	..	1,095	1,164	1,325
Bauchi	..	..	..	..	..	319	346	442
Kano	..	..	..	..	..	344	387	388
Niger	..	..	..	..	..	355	311	476
Other Provinces	..	..	..	..	..	59	91	184

In spite of the bad start to the season and the early cessation of the rains, yields per acre in the more southerly production areas turned out to be little below average. A few showers in October and dewy nights kept the crop going and there was no damage from water logging such as sometimes occurs in August. In the northern areas yields per acre were adversely affected. Due to poor rains and the need to replant corn a good deal of the cotton was planted later than usual. As a result of the attractive price and due to difficulties in establishing grain and groundnut crops, there was a general increase in the area of cotton planted.

Fourteen new markets were opened and six closed, making a net increase of eight and a total of ninety-three. Imported textiles remained in plentiful supply and purchases for the local trade were not abnormal, although reports from Katsina and Sokoto indicated that buyers for French territory were more active than usual for a time. Purchases of Allen seed cotton for export totalled 31,417 tons compared with 25,316 tons in the 1948-49 season. After ginning this should produce 56,000 bales of lint compared with 47,904 bales in 1947-48. The season's figure is the highest achieved since the 1940-41 record of 65,963 bales. Comparative figures on a provincial basis according to markets are as follows :—

						<i>Purchase of seed cotton in tons</i>		
						<i>1947-48</i>	<i>1948-49</i>	<i>1949-50</i>
Katsina	..	..	..	..	..	6,171	12,061	13,425
Sokoto	..	..	..	..	..	1,539	1,966	8,971
Zaria	..	..	..	..	..	1,794	4,992	5,908
Niger	..	..	..	..	..	320	776	1,847
Bauchi	..	..	..	..	..	7	413	1,072
Plateau	..	..	..	..	..	31	108	194
Totals	..	..	..	..	..	<u>9,862</u>	<u>25,316</u>	<u>31,417</u>

The high proportional increases in Niger and Bauchi Provinces are noteworthy. Bauchi is a particularly promising development area ; interest in the crop is increasing rapidly, especially in Gombe Emirate, and there are promising prospects for further substantial expansion of production.

Further progress has been made in speeding up multiplication and distribution of Strain 26C Allen cotton, which in addition to its higher percentage of lint also produces slightly higher yields of seed cotton than commercial Allen. 220 tons of seed were produced from the stage 3 area in 1949-50, which it is estimated is sufficient to plant about 14,000 acres in the stage 4 area in 1950-51. In order to obtain maximum yields, 25 tons of commercial superphosphate were supplied to growers in the earlier stages ; the fertiliser had a marked effect although it proved difficult to get it all applied in time or in the correct way. The area under the initial stage in the scheme, Stage 0, for which selfed seed is supplied by the Cotton Breeder, will be increased from 10 to 20 acres next season, and plans have been made to adjust areas and their location under each stage, in order to reduce considerably the time for the full cycle required to cover distribution of the seed of 26C and subsequent improved varieties, throughout all the Allen cotton area of the Region.

Reports on the work of the Cotton Breeder and Entomologist provided by the Empire Cotton Growing Corporation are included in the Botanical and Entomological sections respectively.

BENNISEED

25. In Benue Province purchases for export in the calendar year 1949 totalled 13,389 tons compared with 14,669 tons in 1948. The acreage planted was about the same as in 1948 but heavy rains at flowering time, especially in the area east of the Katsina Ala river, affected yields. 607 tons from Western Kabba were purchased for export, and 40 tons were bought at Kaltungo in Bauchi Province, a new buying station operating for the first time. Propaganda to weed and thin the crop was continued in the Benue Province, but although most farmers now give the crop one weeding, few are so far prepared to thin. Demonstration plots to show the benefit of thinning, were laid down on 47 plots on farmers' own land, and gave the following yields :—

								lb
Average yield per acre from forty-seven farms weeded thinned	..	..	..	..	..	..	..	313
Average yield per acre from forty-seven farms weeded only	..	..	..	..	..	..	..	211

VIRGINIA TOBACCO

26. The Virginian Tobacco crop produced in Zaria Province in 1948-49 was the largest so far and was again exceeded in 1949-50 in spite of an unfavourable growing season, which led to heavy losses in the seed beds. Comparative figures for the four seasons back to 1946 are given below :—

<i>Year</i>								<i>Zaria Province Purchases Cured leaf in lb</i>
1946-47..	..	..	..	..	..	..	..	167,652
1947-48..	..	..	..	..	..	..	..	82,272
1948-49..	..	..	..	..	..	..	..	206,494
1949-50..	..	..	..	..	..	..	..	256,677

The increase in price for Grade I leaf to 1s in 1947-48 has obviously been satisfactory to the grower, though most areas prefer cotton as a major cash crop now that its price has also risen. Progress was also made in the Gusau area of Sokoto Province where 10,626 lb leaf were bought in the 1948-49 season compared to 2,000 lb the previous year. The estimated acreage was 55. This acreage was expanded to 195 in 1949-50 from which a crop of up to 40,000 lb is expected. Experimental work was also carried out at Gusau in the use of artificial fertilisers on tobacco. This cannot be finally evaluated till curing is completed. On green weights there are indications of response to phosphate. A variety trial completed at Maigana the previous season showed no variety preferable to the Virginia Hybrid now in general use.

GINGER

27. A shortage in the Jamaica crop caused a violent rise in price which affected marketing of the crop. Traders from Lagos were aware of this and bought in most of the crop as split-dried ginger early in the dry season before curing for the market in mid-February began. As a result 240 tons of split-dried ginger presumably mainly from the Kachia area were exported

early in 1950 and only 26½ tons were purchased as cured ginger through the gazetted market. The prices paid at the market in 1949 and 1950 are given for comparison.

							<i>Grade I</i>	<i>Grade II</i>
							<i>Price</i>	<i>Price</i>
							<i>per lb</i>	<i>per lb</i>
							<i>s d</i>	<i>s d</i>
1949	..	..	..	..	..	..	5½	4½
1950 (1st day)	..	..	..	..	..	..	1 11	1 9
1950 (2nd day)	..	..	..	..	..	..	2 3	2 1

No analysis of pre-market samples was taken this year. Batch samples taken after purchase showed that quality was even better than in 1949. Grade I ginger accounted for 91 per cent of the total compared to 83 per cent last year. A change in Regulations governing the marketing of ginger was made in Regulation 21 of 1949 altering payment of stall fees to an export cess of 10s per ton. This led to a large number of buyers competing for the small crop of ginger available. There were twenty-seven Grade I buyers and fourteen Grade II. The spontaneous beginning of a large trade in rough dried ginger for export means that production of cured ginger is becoming less important in the local economy. Unless increased interest is shown by the Jabas in 1951 the market for cured ginger will possibly have to be abandoned.

SUNFLOWER

28. Distribution of sunflower seed was confined to middle belt Provinces and to areas where other export crops are not well established. A total of some 80 tons from the 1949 crops is known to have been purchased for export, 41 tons of which were produced in Bida and Kontagora. The crop did reasonably well in parts of Bida, Kontagora, Shendam, Benue, Ilorin and Western Kabba. In Eastern Kabba vegetative growth was good but yield of seed was poor, possibly due to high humidity during the flowering period. There was some disappointment at the reduction in price compared to the previous season, and as expansion of production is dependent on the growers' reaction to the relative attractiveness of the price offered, it is yet too early to forecast any rapid expansion.

SOYA BEANS

29. Only in Benue Province and particularly in the Tiv Division has there been any substantial increase in the popularity of this crop. It was first introduced there in 1946, and in 1949 purchases for export rose to 1,253 tons compared with 10 tons in 1946, 77 tons in 1947 and 736 in 1948. Fears that the cultivation of Soya Beans might interfere with food production in Tiv Division have proved groundless, and it is encouraging to note that some farmers are now beginning to eat the bean. The crop is superior to benniseed in returns per acre. The 1949 yield at Yandev Farm was 552 lb per acre. Southern Zaria is the only other area where the crop is increasing in popularity and 24 tons were sold for export compared with 9 tons in 1948. Efforts to introduce the crop to Ilorin and Kabba Provinces have not been successful, mainly owing to the damage caused by hares and small antelopes to which the plant appears to be particularly attractive.

RICE

30. In the important rice-growing areas of Sokoto, yields were below average in the northern fadamas which dried out early, but in Argungu and Gwandu Emirates satisfactory crops were harvested. In Niger and Ilorin Provinces where there was little excessive flooding and ample late water, rice did particularly well and yields were above average. The average yield per acre from twelve sample plots recorded in the Pategi and Jafagi Emirates was 2,000 lb paddy. Elsewhere yields were mainly satisfactory except in Kano and Bauchi

where the drought had a serious adverse effect and in some areas caused complete crop failure. Rice cultivation continued to expand, especially in areas where the crop has not been long established. This expansion is particularly evident in Southern Zaria and in the Wukari and Idoma areas of Benue. Distribution of improved seed, mainly Guiana 79 variety, continued and the demand is steadily increasing. Multiplication is carried out in farms established for the purpose or on selected growers' farms, and to maintain purity, a quantity of selfed seed is produced annually by the Botanist. A yield of over 4,000 lb paddy per acre was recorded under controlled flooding on a multiplication farm at Maigana. In the main fadama areas in Sokoto we have not yet produced a white rice as tolerant to the variable flood conditions as the native rice. Under these conditions distribution of exotic rice seed is making slow headway, though in areas outside the main fadama, where rice growing is less hazardous, white rice is extremely popular and is rapidly taking the place of the native rice.

As a result of the difficulty in obtaining from the 1948 crop adequate supplies of hand-prepared rice for further processing the rice mills at Badeggi and Baro could not be operated at full economic capacity during 1949. It became necessary to close down the Baro mill and move some of the machinery to Badeggi so that we can concentrate on a larger unit there. 500 tons of hand-prepared rice have already been purchased for the 1950 season and this should allow the enlarged Badeggi unit to operate on an economic basis. Unfortunately no success has yet been achieved in persuading growers or middlemen to bring in parboiled paddy for processing. The first privately owned rice mill in the Region, a Grant's No. 1 Planters Mill was in the course of erection in March 1950 at Utonkon in Benue Province. This belongs to an African Syndicate who have received a loan from the Development Loans Board for the project.

SUGAR

31. New crushers did not arrive till towards the end of the 1948-49 season and many of them were not put into service till November 1949. Of a total of 564 crushers known to be in the country only 375 actually worked this season. They were put into service for the 1949-50 season, unfortunately a poor one resulting from the shortage of rain. The position has become more healthy for the cane-grower. Where previously there was more cane than the crushers could deal with, there is now excess crushing capacity. The numbers of crushers and the estimated output for 1947-48 and 1948-49 are given below :—

<i>Province</i>	1947-48		1948-49	
	<i>No. of Crushers</i>	<i>Estimated output Tons</i>	<i>No. of Crushers</i>	<i>Estimated output Tons</i>
Adamawa	6	19	7	43
Bauchi	3	30	18	30
Bornu	—	—	—	—
Kano	54	570	105	990
Katsina	28	450	98	1,550
Niger	1	—	1	—
Sokoto	36	188	103	134
Zaria	116	2,900	232	3,150
TOTAL	244	4,157	564	5,897

A number of cane-mills made in England were imported early in 1949 for comparison with the standard Indian make now in service. They were not successful. A fault in design caused frequent breakages in the gear-wheels and it has been decided to standardise on the cheaper Indian machine. A small power-operated crusher has been purchased and will be

tried out in Zaria Province next season. Improved boiling pans and furnaces are also on order.

Experimental work was begun at Maigana on application of artificial fertilisers to the local variety of cane. The following yields were obtained with :

N = 100 lb Sulphate of ammonia per acre.

P = 100 lb Superphosphate per acre.

CLEAN SUGAR-CANE

							<i>Tons per acre</i>	<i>Percentage of control</i>
2N2P	..	..	..	..	..	..	19.02	= 181
2N2P	..	..	..	..	..	..	17.73	= 169
NP	..	..	..	..	..	..	17.09	= 163
N	..	..	..	..	..	..	14.97	= 143
2P	..	..	..	..	..	..	14.48	= 138
2NP	..	..	..	..	..	..	14.37	= 137
P	..	..	..	..	..	..	13.20	= 126
2N	..	..	..	..	..	..	11.13	= 106
O	..	..	..	..	..	..	10.5	= 100

The apparent profit for the NP. dressing in terms of cash would be over £41 for every £1 expended on fertilisers. The results are somewhat conflicting owing to difficulties in experimentation on swampy land, but there can be little doubt that a dressing of 100 lb superphosphate and 100 lb sulphate of ammonia could be used by cane-growers to advantage.

FIBRES

32. Rama (*Hibiscus Cannabinus*), which is commonly cultivated in many parts of the Region usually as a compound crop for the fibre for local needs, has proved to be a suitable substitute for jute for certain purposes including sacks and hessian. In view of the difficult jute supply position, attempts were made in co-operation with the Departments of Commerce and Industries, and Marketing and Exports, to encourage cultivation of the crop and the preparation of suitable fibre in the Niger and Ilorin Provinces. In the Bida area a flourishing industry in rope and twine already exists. Over 9 tons of seed were issued free to farmers of which 7½ tons were obtained from other Provinces. Propaganda to encourage rama cultivation was carried out and demonstrations of retting methods were given by the Department of Commerce and Industries. The Department of Marketing and Exports arranged for the fibre to be purchased at local buying stations at a price of 4½d per lb. Not unexpectedly this price proved quite unattractive to growers and a total of only just over 12 tons of fibre was purchased by the end of March 1950. It is apparent that under present conditions farmers will not find rama cultivation attractive at a price for fibre much less than about 8d per lb, which is an uneconomic price for industrial use. A comprehensive series of experiments on rama cultivation were carried out and results are described in the section of the report dealing with experimental work.

FRUIT

33. Nurseries of which those at Zaria and Yandev are the largest, were maintained at several centres for the production and distribution of fruit planting material, and over 12,000 young trees were distributed during the year. This total included 7,000 budded citrus and 3,500 budded mangoes. Despite the keen demand for citrus fruit, individuals cannot yet be persuaded to give the care and attention to the young trees necessary for survival, and the casualty rate among citrus trees distributed in the past has been very high. In the northern belt of the Region in particular, citrus will only survive and produce fruit under special

conditions involving some form of irrigation, but it will not tolerate water logging. In such areas the only satisfactory method of extending citrus cultivation is by means of fairly large orchards at specially selected sites, either run as individual or communal concerns or by Native Administrations. Special attention has been paid to developing citrus cultivation on these lines in Sokoto Province with promising results, and further expansion is planned in these areas and elsewhere. There is a great demand for budded mangoes in Bornu, and although over 3,000 were distributed at 1s each, demand continued to exceed supply.

A citrus trial at Samaru has shown that ROUGH LEMON is far superior to SOUR ORANGE or ACID LIME as a root stock, but at Ilorin sour orange is still maintaining its superiority, as shown by the following yield figures from a root stock trial with grapefruit at the scion.

	<i>Root Stock</i>					<i>Annual average number</i>	<i>Average weight</i>
						<i>of fruit per tree</i> <i>1947-50</i>	<i>of 100 fruits</i> <i>lb</i>
Sour orange ..	..	..	..	..	..	368	65
Sweet orange ..	..	..	..	..	..	260	61
Acid lime ..	..	..	..	..	..	181	69
Rough lemon ..	..	..	..	..	..	151	78
Shaddock ..	..	..	..	..	..	128	62
Grapefruit ..	..	..	..	..	..	116	60

VEGETABLES

34. The production of European vegetables is regaining popularity near Kano. Some £30 worth of imported seeds were sold monthly through a Native Administration scheme, and approximately 613 tons of mixed vegetables were railed southwards between June 1949 and March 1950.

Onions continue to provide a most important source of revenue to farmers, particularly in Kano, Zaria and Sokoto Provinces, and although few definite figures of production are available very large quantities are sent to the south. The crop is normally grown under irrigation in the dry season, but growers in the rocky areas south of Zaria city produce a wet-season crop which fetches particularly high prices and 1949 prices ranged from £22 to £28 per ton. In Western Sokoto, from which area 680 tons of onions were exported southwards by railway motors alone, prices to growers dropped to under £2 10s per ton towards the end of the season. Grading and recording of railments of potatoes by the Department of Marketing and Exports ceased in September 1949 and available comparative railment figures from the centres of production in Plateau and Zaria Provinces are as follows :—

						<i>Jan. to Sept.,</i>		
						<i>1947</i>	<i>1948</i>	<i>1949</i>
						<i>tons</i>	<i>tons</i>	<i>tons</i>
Plateau ..	..	..	..	..	..	396	516	475
Zaria ..	..	..	..	..	..	133	187	131

The season adversely affected yields in Zaria but was favourable in Plateau where production continues to increase and quality was remarkably good. Prices to growers ranged from £28 to £65 per ton.

KASHIN YAWO—ACANTHOSPERMUM HISPIDUM

35. The weed *Acanthospermum Hispidum* continues to be a serious menace in Kano and other Provinces along the northern border. Unfortunately, although a large supply was obtained of the chemical 2-4D which has given good results in experimental work on the control of the weed, the necessary spraying equipment ordered from the United Kingdom did not arrive in time to enable large-scale trials of mechanical spraying to be carried out in 1949,

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INTRODUCTION

Some improvement in the staff position enabled an Agricultural Superintendent to be posted to Benin to supervise work in Benin and Warri Provinces, but subsequent wastage of officers has placed the Department once more in the position of barely being able to maintain its present commitments. The ever-increasing demands for advisory services particularly in connection with applications for financial assistance from the Production Development Board, has aggravated the effect of the lack of experienced officers and placed a very heavy burden on the existing staff. Under these conditions the evolution and putting into effect of plans of orderly sound development are becoming increasingly difficult. It is particularly unfortunate that with the rapidly awakening appreciation of the importance of agricultural development the activities of the Department should be so circumscribed by lack of staff.

THE 1949 SEASON

2. With the exception of Benin and Warri Provinces rainfall was above average but distribution was poor particularly early in the season. This had an adverse effect on early crops in some areas, notably the Colony, whereas others, such as Abeokuta, report a favourable season. Rainfall in Benin and Warri areas was below average but fairly satisfactory distribution offset any adverse effects and average crops are reported. The following table gives the rainfall for representative stations in the Western Provinces :—

Months	Agege	Abeokuta	Moor Plantation	Oyo	Akure	Benin	Warri
	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>	<i>ins.</i>
January	—	0.05	0.28	—	—	2.22	0.02
February	1.19	1.79	0.67	—	0.61	0.36	1.25
March	4.27	1.74	1.24	2.12	1.17	2.00	5.77
April	3.55	2.40	4.07	4.93	4.04	5.66	5.08
May	9.36	5.23	7.23	4.37	7.84	6.11	6.81
June	9.74	2.73	9.00	6.59	7.78	9.08	16.82
July	6.56	8.28	6.99	6.74	11.66	13.72	29.27
August	2.93	4.66	4.07	3.73	9.38	6.79	31.03
September	6.53	7.55	9.77	6.00	7.76	11.88	13.45
October	8.71	5.89	9.08	7.26	8.82	10.78	9.61
November	3.39	3.20	1.06	0.49	2.29	1.24	3.78
December	1.34	0.93	0.41	—	—	—	0.95
TOTAL	57.57	44.45	53.87	42.23	61.35	69.84	123.84
Average for past years ..	52.52 22 years	46.27 10 years	48.94 39 years	43.86 12 years	55.81 19 years	87.43 26 years	113.55 3 years

ANIMAL HUSBANDRY

CATTLE

3. (i) *N'damu Multiplication Herd*.— The health of the herd has been most satisfactory and only six deaths occurred from various causes. The increases are shown in the following table :—

	Bulls	Cows	Bull Calves	Heifer Calves	Total	Remarks
Stock 1-1-49	15	72	33	39	159	
Births	—	—	17	9	26	
Deaths	—	—	—	—	—	
Receipts	—	—	—	—	—	
Transfers	4	—	—	—	4	
Cullings	—	—	—	—	—	To Moor Plantation, Umudike, Abakaliki and Nkwelle

Stock 31-3-49	11	72	50	48	181	
Births	—	—	33	36	69	From Dahomey via Agee. To Farm Schools and Abeokuta.
Deaths	4	3	2	1	10	
Receipts	—	4	—	—	4	
Transfers	3	—	—	—	3	
Cullings	1	—	—	—	1	
Stock 31-3-50	29	104	55	52	240	

The average weight of both bull and heifer calves at birth was 40 lb with a subsequent average live-weight increase of 1.6 lb per day for both sexes, an increase of 0.1 lb per day over 1948. The average period between calves was 400 days compared with 410 in 1948.

Contagious Abortion.—Three abortions occurred, the cow being negative to contagious abortion in each case. In one case there was heavy infestation with trypanosomiasis. It has been decided on the advice of the Veterinary Department that all females should be treated with S.19 vaccine against contagious abortion, and that, when this is completed, segregation of kraals could cease and stock be issued to other stations. By the end of the year the S.19 vaccine had not yet arrived but was expected shortly. The introduction of this system will simplify management, and should speed up multiplication.

Trypanosomiasis.—Routine testing was introduced in May 1949 and from 1,930 tests applied, 114 cases showed the presence of Trypanosomiasis. The few cases that showed clinical symptoms of Trypanosomiasis made a spontaneous recovery and no treatment was given. Routine inoculations against Anthrax, Blackquarter, Pleuro-pneumonia and Haemorrhagic Septicaemia were carried out.

No change was made in methods of management, the cattle continuing under semi-range conditions and being kraaled at night. No concentrates were fed, except to nursing cows and calves for 3 weeks after weaning in the dry season. These received only 2 lb daily of a mixture of cassava, cotton seed, palm-kernel meal and guinea-corn.

(ii) *Farm School Herds.*—Herds of Ilorin Borgawa (Kaiama) female stock were maintained in connection with the farm schools at Oyo and Ogbomosho. These were run with N'dama bulls and the results are most satisfactory. The health of the stock remained good.

(iii) *Moor Plantation Shorthorn (Muturu) Herd.*—The policy of grading up this herd of Gold Coast and Nigerian Shorthorn to N'dama bulls has continued with success. The effect of this policy on the birth weight and performance of the progeny is shown in the following figures :—

Breed and Number of Animals		Av. Wt. Birth lb.	Av. Wt. weaning 7 months lb.	Av. Wt. 12 months lb.	Av. Wt. 18 months lb.	Av. Wt. 24 months lb.	Av. Wt. 30 months lb.	Av. Wt. 36 months lb.
2	ND 1 NS (5)	26.4	115.4	162.0	249.5	309.0	360.0	366.0
1	ND 2 GC (7)	34.0	142.8	171.4	274.1	340.9	458.0	468.5
1	ND 1 NS (4)	29.6	153.0	189.6	240.3	301.0	379.0	458.0
1	ND 1 GC (3)	33.0	159.3	211.0	290.3	not yet available		

The object of the herd is to produce work cattle and manure for Moor Plantation and grade stock for issue pending the production of sufficient N'dama stock at Oyo.

Extension Work.—Cattle have a very small place in the economy of the Western Region. The village herds are not controlled, and are kept mainly to acquire prestige and for slaughter

on ceremonial occasions. Efforts are now being made, particularly in Ondo and Benin Provinces, to persuade cattle owners to keep their cattle in communal kraals in order to make manure, and enable improved management to be adopted. This will be of increasing importance as improved stock becomes available from Oyo. Fifty-four controlled herds are maintained in Ondo and thirteen in Benin Provinces and it is the intention to issue N'dama stock bulls to these herds from Oyo as soon as possible. Demonstrations of the value of farm-yard manure are given, so far without much success.

DAIRIES

4. (i) *Agege Dairy*.—Since the move to the new site recorded in my 1948 report there has been steady improvement both in the management and in the economic aspects of this project. The improvement in health resulting from regular daily grazing has been maintained, and grazing is still confined to the central fields which are more than 150 yards from the nearest bush. A serious economic set-back occurred with an outbreak of foot and mouth disease in July and August 1949, and, while no animals were lost from this disease, there, was, of course, a considerable drop in yield during the period of the outbreak. Only five cases of trypanosomiasis and three cases of contagious abortion were recorded and the general health of the stock has been most satisfactory.

Labour costs have been reduced considerably by the reorganisation of routine and the introduction of the mechanical cultivation of cassava, and it has been possible to reduce the wholesale price of milk from 5s to 4s 8d per gallon. Apart from organisation and management the economy of the dairy naturally depends on the yield of the cows and, while there has been a further improvement in the average yield from 8.0 lb to 8.65 lb per day, we are still having to carry several uneconomic cows in order to maintain our total yield which averaged 40 gallons per day in March 1950 compared with 32 gallons quoted in my 1948 report.

(ii) *Moor Plantation Dairy*.—As reported in my 1948 report the herd was increased to eighteen in order to improve the economics of the dairy and on the results of the past years' working further economies can now be effected, and it is also evident that several of the cows are uneconomic and will be culled. The daily production averaged just under ten gallons per day in March 1950, and the average yield per cow over the year was 6.2 lb per day.

(iii) *General*.—The evolution of an economic system of dairy management for the production of urban supplies in the Southern Provinces is becoming a matter of increasing urgency. Our work at Agege and Moor Plantation now show that it is possible to manage stock under these conditions but the low productivity of the local breeds makes economic production extremely difficult, and the large number of stock required to supply any appreciable proportion of the demand presents another considerable problem. The possibility of using imported breeds for grading up the local stock for use in urban dairies is now being more actively considered in conjunction with the Veterinary Department, and it is probable that experimental importations will be made in the near future.

POULTRY

5. (i) *Oyo Poultry Farm*.—The transfer of the flock from its temporary quarters on the stock farm at mile 12, to its own quarters at mile 11, was completed by the end of the year. The usual teething troubles expected with the initial establishment of projects of this kind have been experienced. In addition the performance of the imported foundation stock has been disappointing and outbreaks of fowl pox have considerably upset our production programme, which was further reduced by technical faults in the Secura incubator installation.

During the fifteen months period January 1949 to March 1950, 25,292 eggs were collected and 15,996 set for hatching, producing 9,910 RIR. chicks, a hatching percentage of

49.5 per cent. By the end of the period 1,744 birds had reached four months old and been issued.

The control of disease is still a problem, not so much from the point of view of mortality as dislocation of production and distribution. At one stage an outbreak of fowl pox resulted in such overcrowding that incubation had to be suspended. Another problem has been the high mortality amongst young chicks amounting to about 50 per cent. Improvement in the type of brooder and brooder management has about halved this mortality and it is expected that this aspect will be under control in the near future.

A careful review of the results obtained to-date has been made and the organisation has been completely overhauled and redesigned in the light of these results. The issue of certificates to recognised breeders in UK. by the Ministry of Agriculture has simplified the problem of obtaining sound foundation stock and 100-day old chicks have recently been imported from one of these breeders, and a number of mature cocks are on order. Production will now be carried out in two stages. The first will exist only at Oyo and Agege and will be the Foundation Stock Breeding Centre. This will house the imported breeding flock and the very best birds from our own breeding and will produce the breeding flocks for the multiplication centres which will be situated in the three Regions. Birds bred at the production centres will be available for issue through the distribution centres situated in the Provinces.

The arrival of equipment from UK. and the establishment of the flock on its permanent site makes it possible to carry out investigation in poultry management and a comprehensive programme of controlled experiments and observations has been drawn up. Considerable progress has already been made in house design for various purposes.

The observation pens of ducks, geese and Nigerian poultry have been maintained but pending the proper establishment of the RIR. flock these are being used for observation purposes only. It is hoped to be able to undertake planned work on these and other UK. breeds of poultry during the coming year.

(ii) *Agege Sub-station.*—It is intended that Agege shall form an insurance against disaster at Oyo. A small foundation breeding stock centre will be maintained in addition to the multiplication flock serving the Colony area which already exists there. In addition, a proportion of the investigation work will be allocated to this station. The station was actually opened in July 1949, and has been mainly concerned with establishing a breeding flock. Recording has commenced and 269 birds and 547 hatching eggs have been distributed.

(iii) *Agricultural Stations.*—Small flocks are maintained at most of the Native Administration centres for the purpose of providing stock for distribution. When production at Oyo is sufficient these will become distribution centres for the stock from Oyo.

PIGS

6. A number of small departmental piggeries have been established with the object of producing breeding stock for distribution. Pig-keeping is becoming increasingly popular but the main stumbling block has been the difficulty in persuading prospective pig-keepers to build pens to approved specifications, and lack of appreciation of the vital importance of a high level of feeding. Another obstacle to profitable pig-keeping is the reluctance of the owner to do any of the work himself and inefficient supervision of the paid labour. Some difficulty has been experienced by pig-keepers in obtaining supplies of concentrated feeds such as groundnut cake, but this is being steadily overcome. Oyo NA. is performing a most useful service in this connection by buying supplies of feeding stuffs in bulk which can be purchased by approved pig-keepers. Trouble with Trypanosomiasis infection has been overcome in the Colony by the use of a simple split rafia-cane screening. Many pig-keepers

continue to loose money owing to refusal to maintain the high standards of feeding and management essential for improved breeds.

The majority of the pigs issued were grade pigs usually $\frac{3}{4}$ to 15/16 large white. Some saddle-back crosses were also used with success. Little difference in performance was evident at Moor Plantation between the various grades but there appears to be evidence that the more highly bred sows do not stand up to the strain of rearing their litters as well as those with a higher degree of native blood. The requirements of the local market are somewhat different from those of the Cold Store and, if the improvement in the staff position materialises, it is intended to carry out more detailed investigations on these points. There is a great deal of work yet to be done on the type and management of pigs for this Region.

FODDER AND PASTURES

7. The management of grassland is becoming of increasing importance in connection with our investigations into mechanisation, as grass is the obvious crop for strip cropping and for the fallow period. A considerable number of trials were carried out at Moor Plantation on the establishment, manuring, and management of grass both for pasture and fodder, and a number of local and introduced species and varieties are being tested.

The following are the highest yielding fodder grasses which have been tested to date :—

	<i>Average Yield</i> 1945-49 <i>tons per acre</i>					
Fodder Cane No. 9	..	..	..	..	..	8.8
Guinea Grass (ex Cameroons)	..	..	..	..	..	7.8
Guinea Grass	..	..	..	..	..	8.7
Elephant Grass	..	..	..	..	..	12.3
Ibadan Gamba.. .. .	..	..	..	..	..	6.0
Ilorin Gamba	..	..	..	..	..	11.2

This most important work requires the attention of a Specialist and it is hoped that one will be recruited in the near future.

EXPERIMENTAL UNIT FARMS

8. The experimental unit farms still form a most important step in the passing of information from our experimental farms to the peasant farmer. Frequently the findings of the research station need further test under conditions more nearly approaching those that obtain with the farmer, in order to determine how they will fit into the farming programme and the economic framework of a peasant farm. In these circumstances the work is incorporated into a unit farm based, in size and organisation, on a peasant holding and run by a man and his family under supervision. Proved systems pass from these experimental unit farms to demonstration units usually run by the Native Administrations and form the basis of the propaganda work of the extension staff. In assessing the value of the results from these experimental units the character of the farmer must receive consideration, as much, of course, depends upon the industry of the farmer and his family.

On Moor Plantation we have seven experimental unit farms, which were started in 1944 and reorganised in 1947. Several experimental units are being set up in connection with our work at Agege and also the poultry work at Oyo. The units at Moor Plantation are carefully costed and give most interesting results which are briefly summarised below.

Unit Farm No. 1.—Cattle Cultivation :

Number in Family Farmer and two boys.

Stock carried Two work bulls, two cows, twelve RIR. hens and a cock.

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	..	4.0
Citrus	..	..	..	..	..	..	..	..	0.25
Coffee interplanted Kola	..	..	..	..	..	..	..	..	0.75
Fuel	..	..	..	..	..	..	..	..	1.5
Fodder	..	..	..	..	..	..	..	..	1.0
Grazing.. ..	..	..	..	..	..	..	..	..	5.5
Total	..	..	..	..	..	..	..	..	13.5

Gross Profit :—1947 £18 17s 11d ; 1948 £24 1s 2d ; 1949 £57 14s 10d

Unit Farm No. 2.—Handworked :

Number in Family Farmer alone.

Stock carried One ram, twelve ewes, twelve hens and one RIR. cock.

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	..	2.0
Centrosema (grazing) and fruit	..	..	..	..	..	..	..	..	3.0
Fuel Plantation	..	..	..	..	..	..	..	..	1.5
Grazing.. ..	..	..	..	..	..	..	..	..	0.5
Total	..	..	..	..	..	..	..	..	7.5

Gross profit :—1947 £23 8s 11d ; 1948 £30 16s 10d ; 1949 £14 19s 1d.

N.B.—Previous tenant unsatisfactory and farm suffered a set-back and foundation stock lost.

Unit Farm No. 3.—Handworked :

Size of Family Farmer, wife, child and boy at school.

Stock carried One ram, twelve ewes, twelve hens, and one RIR. cock.

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	..	2.0
Centrosema and Fruit..	..	..	..	..	..	..	..	..	3.0
Fuel Plantation	..	..	..	..	..	..	..	..	1.5
Grazing.. ..	..	..	..	..	..	..	..	..	0.5
Total	..	..	..	..	..	..	..	..	7.5

Gross profit :—1947 £26 12s 3d ; 1948 £33 17s 1d ; 1949 £42 0s 5d.

N.B.—Similarity to No. 2. Difference in profit reflects difference in industry of tenant.

Unit Farm No. 4.—Poultry and Vegetables :

Size of Family Farmer, wife, boy at school, and servant.
 Stock carried One ram, twelve ewes, four RIR. cocks and sixty hens

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	..	1.87
Fuel Plantation	..	..	..	..	..	..	..	..	1.5
Poultry and Vegetables	..	..	..	..	..	..	..	..	2.0
Molasses grass under Citrus	..	..	..	..	..	..	..	..	1.0
Centrosema in sheep pen	..	..	..	..	..	..	..	..	0.63
Centrosema under mixed fruit	..	..	..	..	..	..	..	..	0.50
Total	..	..	..	..	..	..	..	..	7.5

Gross profit :—1947 £8 5s 6d ; 1948 £15 14s 7d ; 1949 £21 16s 10d.

Unit Farm No. 6.—Coconuts and Cattle Fattening :

Size of Family Farmer, wife, three children and servant.
 Stock carried Two bulls (fattening), one ram, six ewes, one cock and twelve hens.

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.25
Arable	..	..	..	..	..	..	..	..	2.25
Centrosema grazing under Coconuts	..	..	..	..	..	..	..	..	5.75
Fodder canes and grass	..	..	..	..	..	..	..	..	0.57
Fuel Plantation	..	..	..	..	..	..	..	..	1.50
Total	..	..	..	..	..	..	..	..	10.32

Gross profit :—1947 £62 9s 10d ; 1948 £70 11s 1d ; 1949 £89 12s 2d.

Unit Farm No. 7.—Cattle Fattening :

Size of Family Farmer, wife, two children and two servants.
 Stock carried Four fattening bullocks, one cock and twelve hens.

Acreage									acres
House and Compound	..	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	..	2.0
Molasses grass under mixed fruits	..	..	..	..	..	..	..	..	0.5
Elephant grass under Citrus	..	..	..	..	..	..	..	..	3.0
Fuel Plantation	..	..	..	..	..	..	..	..	1.5
Total	..	..	..	..	..	..	..	..	7.5

Gross profit :—1947 £0 14s 7d ; 1948 £20 11s 10d ; 1949 £80 6s 1d.

Unit Farm No. 8.—Pigs and Fruit

Size of Family	..	..	Farmer, two wives, two children and one servant.					
Stock carried	..	..	One boar, two sows and their offspring, one cock and twelve hens.					
Acreage								<i>acres</i>
House and Compound	..	..	..	..	..	..	..	0.5
Arable	..	..	..	..	..	..	..	3.5
Pig Paddock and fruit	..	..	..	..	..	..	..	0.5
Fruits	..	..	..	..	..	..	..	1.5
Fuel Plantation	..	..	..	..	..	..	..	1.5
Total	..	..	..	..	..	..	..	<u>7.5</u>

Gross profit :—1947 £6 19s 2d ; 1948 £44 0s 1d ; 1949 £177 0s 9d.

FARM SCHOOLS

9. In an effort to overcome the difficulties enumerated in my 1948 report, the policy has been reviewed and we are now recruiting illiterate boys of fourteen years old. They will remain in the School for four years and, in addition to vocational training in Agriculture, will receive sufficient general education to make them literate. Two of the main reasons for failure of these men after leaving the School has been apathy of the farmer and local antagonism and ridicule of the new methods. Yields obtained from the farms over the past seven years at Oyo leave no doubt as to the soundness of the systems of farming which are being taught there, but, in spite of the greatly increased returns, the system has not yet proved attractive to the local farmer. To overcome this it is proposed to form the new class of students both at Oyo and Ogbomosho into group settlements, which should free them from local criticism and instil some spirit of competition and co-operation. The post-training supervision and assistance will also be much easier to provide and more efficient, and the possibilities of further development much greater under this system. The demand for similar schools in other areas continue but the establishment of such schools is being approached with caution until the results of the Oyo and Ogbomosho experiments are clearer, and the policy for these schools is under continuous review.

OIL PALMS

10. The great bulk of the palm products in the Western Region still come from groves of wild palms situated mainly in Benin and Warri Provinces. Many of these groves are only partially exploited and in some areas the palm oil is not exploited at all and the kernels are only collected after the bunches have rotted and the kernels fallen to the ground. Propaganda for the orderly planting of improved material from the Oil Palm Research Station has been intensified in connection with the rehabilitation schemes of the Cocoa Section and also the Pioneer Oil Mill installations being made by the Regional Oil Palm Production Development Board. The Board proposes to erect fifteen mills in the first instance and provision for further expansion has been made. The mills in operation in Warri Province are proving most successful and popular and it is intended that each mill shall be the focal point for extension work in that area.

The demand for hand-operated palm oil presses has so far exceeded supply, but greatly improved deliveries are expected during the next twelve months.

The total tonnage of palm oil and palm kernels graded in the Western Provinces and the Colony are shown below.

	1948		1949		Increase or Decrease	
	Oil Tons	Kernels Tons	Oil Tons	Kernels Tons	Oil Tons	Kernels Tons
Western Provinces	23,533	147,194	27,428	161,418	+3,895	+14,224
Colony	85	15,946	1,394	16,927	+1,309	+ 981
TOTAL	23,618	163,140	28,822	178,345	+5,204	+15,205

COCOA

11. The increasing complexity of the problem presented by the cocoa industry, not only the rehabilitation of the Swollen Shoot areas but the orderly rehabilitation of the whole industry, has made it necessary to form a separate section whose sole concern is cocoa. This section is under the direction of Deputy Director of Agriculture (Cocoa) who will submit a separate report.

FRUIT

12. (i) *Nurseries*.—The following table gives particulars of the more popular varieties of fruits distributed from Government and Native Administration nurseries in 1949.

Nursery	Sweet Orange	King Orange	Tan- gerine	Grape fruit	Lemon	Mango	Avocado	Banana	Kola	Coconut	Coffee	Oil Palm
Abeokuta Province												
Egba NA. ..	91	5	64	118	79	—	—	—	—	—	—	—
Ijebu-Ode ..	218	—	5	20	—	—	—	—	—	—	—	—
Ondo Province ..	891	—	161	133	54	85	39	158	—	—	944	—
Oyo Province ..	482	—	9	38	—	309	—	—	492	172	—	2,340
Benin Province ..	1,330	—	346	232	59	221	46	—	198	23	1,380	22,000
Warri Province ..	427	—	—	4	170	38	—	—	62	—	348	—
TOTAL ..	3,439	5	585	545	362	653	85	158	752	195	2,672	24,340

(ii) *Fruit Products*.—The Blaize Memorial Institute continued to work to capacity and is now contemplating considerable expansion to meet the ever increasing demand for its products.

The Agege Farmers Co-operative Society has also had a good year and has formed a most useful outlet for the members' surpluses. The total production of squashes by this Society for the year was 7,232 bottles.

(iii) *Export of Fruit Products*.—Arrangements for the dispatch of a further trial shipment to the United Kingdom had been made but this had to be cancelled owing to the non-arrival of the necessary wrapping paper. Further expansion of citrus plantation in this Region requires organised markets, both internal and export, and until these can be provided farmers are not being advised to plant. Every effort is, however, made to meet requests for planting material after explaining the position to the applicant. The importance of developing an export trade is becoming increasingly important in connection with the Swollen Shoot rehabilitation plans and projects of the Production Boards. Investigation of this aspect of the work is now being undertaken by the Department of Commerce and Industries.

MECHANISATION

13. Considerable progress has been made with the establishment of the Agricultural Engineering Branch at Fashola. Machinery and equipment which has been on order for a considerable time is now coming forward and preparations are in progress to establish a

completely mechanised Tractor Unit Farm at Fashola during the coming season. The object of the Engineering Branch will be, initially, to test and select the most suitable minimum unitary equipment for the various operations which are likely to be necessary in the Western Provinces. This will, of course, necessitate testing a considerable range of types and makes of equipment. This Branch will also service all the machinery maintained by the Department in the Region and, as a result of its experience in testing the various types of machinery will be in a position to give considered advice in connection with the equipment of Agricultural projects contemplated by private enterprise, the Development Boards or by Government.

A trial to investigate the problems of mechanised, contour strip cropping is being laid down at Moor Plantation, and an economic estate incorporating mechanical cultivation of annual crops is being developed at Akure. In the Colony the cultivation of cassava for the dairy has been mechanised with success, and the possibilities of its application to small groups of farmers is being studied.

ARTIFICIAL FERTILISERS

14. The increasing importance of artificial fertilisers, particularly in the evolution of group farming and mechanised projects is fully appreciated and is being studied in detail at Moor Plantation. The report of the Chemistry Section deals with this aspect and it is hoped that the results of trials now in hand will permit extensive field trials to be made.

NIGERIAN BIRDSEYE CHILLIES

15. Owing to the uncertain price and lack of buyers in 1948 no seed was distributed for 1949 planting and farmers were not encouraged to plant. Little interest was shown but late in the season the price increased to £170 ton. Encouraged by the increase in price farmers are now demanding seed and this will be supplied while stocks last. No definite action will be taken to encourage planting unless the firms announce a satisfactory assured price before planting commences. The Chillies Co-operative Society has been wound up and farmers will now deal direct with the firms.

RICE

16. The season, on the whole, has been satisfactory but certain areas, notably the Colony, were affected by flooding. There is no doubt that the acreage is increasing rapidly, but the wide fluctuation in water levels from year to year in the creek areas, and the heavy labour requirement for the initial cultivation is hindering expansion in these areas.

Rice Mills.—These mills are becoming increasingly popular and, where the out-turn is sufficient, it has been shown that they can prove profitable investments when operating at prices attractive to the producers. It is hoped that the provision of this service, reducing the labour involved in the preparation of rice for the market, will encourage increased production in the areas served. The operation of these mills has provided invaluable information and experience enabling considered advice to be given to the Production Development Board on the making of loans for the establishments of rice mills.

COTTON

17. There has been no revival of interest in the export market for cotton. Prices for export cannot compete with those for the internal trade and production for export was negligible amounting to only ten bales of 400 lb weight.

TOBACCO

18. The season was a satisfactory one and leaf curl, which was serious in 1948, was not particularly troublesome in 1949. The main producing area in Oyo Province is being

protected by regulation insisting that the land is free of tobacco for the period from 1st February to 1st March.

The fertiliser experiment carried out in conjunction with the British American Tobacco Company was badly attacked by stem borer and it will have to be repeated. There were, however, indications that both yield and quality had been considerably improved by all treatments.

TETRACARPIDIUM CONOPHORUM

19. This is a wild plant native of the high rain forest areas. It is of a vine habit climbing the forest trees until it emerges through the canopy to flower and fruit. Attempts are now being made to evolve a plantation technique for this plant and we have found that it can be grown from fresh seed and, under favourable conditions it will commence bearing in about three years. Losses are very heavy during the first two dry seasons and the management of shade and supports has not yet been worked out satisfactorily. Results so far obtained, however, indicate that the possibility of establishing this plant as a plantation crop are very promising and further trials on the basis of these results are being considered.

Samples of oil for commercial test were prepared by the Chemist who will deal with this aspect in his report.

HEVEA RUBBER

20. The price of rubber was not attractive to producers but an increase towards the end of the year revived interest and tapping commenced again. Tapping was handicapped by labour difficulties and production of all grades amounted to 3,812.46 tons compared with 3,799 tons in 1948.

AGRICULTURAL SHOWS

21. (i) *Colony Agricultural Show*.—The Colony Agricultural Show was held at Agege in November 1949 and was very largely attended. Thirty-nine classes were competed for in all and apart from cattle classes and the processed foodstuff classes which were not represented, the qualities and quantities were highly satisfactory.

Other features of the Show included the demonstration stalls put up by the Agricultural Department and the stalls stocked with agricultural equipment and machinery by commercial firms in Lagos. The firms of Messrs Joe Allen and BEWAC. also gave successful ploughing demonstrations.

(ii) *Farmers' Week*.—A Farmers' Week was held at Moor Plantation in which considerable interest was shown.

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STAFF AND GENERAL

The following table shows how far the present Senior Staff position falls short of the full cadre for the Region :—

								<i>Present Staff</i>	<i>Full Cadre</i>
<i>Headquarters :</i>									
Staff Officers	..	..	..	..	..	..	..	2	2
Secretary	..	..	..	..	..	..	..	—	1
<i>Field Staff :</i>									
Senior Agricultural Officers and Agricultural Officers	..	..						*4	12
Agricultural Superintendents	..	..	..	..	..	..	..	4	4
Agricultural Development Officers		..	..	..	..	..	..	2	4
Mechanic-Demonstrator	..	..	..	..	..	..	..	1	1

The above table does not include Specialist Officers since the position regarding the posting of these officers to the Eastern Region will not be clarified until the West African Agricultural and Forestry Research Organisation and the West African Rice Research Scheme are fully operative. There are no Specialist Officers permanently in the Region at present.

2. The problem of maintaining an adequate Junior Service staff of Agricultural Assistants is equally pressing. There is a continual wastage in this group which largely offsets the trained recruits who pass through the Agricultural School at Ibadan each year. It is obvious that consideration will have to be given to the setting up of a School of Agriculture in the East to provide not only junior staff for the Department but also to meet the need for technical assistants for development projects.

3. The creation of the Eastern Region Oil Palm Production Development Board and the Eastern Regional Development Board has increased the amount of advisory work required of the Department in respect of development projects and loans respectively.

4. The setting up of a Liaison Committee, consisting of three Unofficial Members of the Eastern House of Assembly, marks a useful step in securing the benefits to be derived from enlightened unofficial co-operation and criticism. The Committee is kept fully informed of the work in progress and of any new proposals involving policy.

5. *New Stations and Prospects.*—Work on the development of the farm at Abakaliki continued during the year and the farm is now beginning to take shape. The building programme is proceeding satisfactorily and early trials of tractor cultivation have proved promising.

6. Satisfactory progress has been made with the development of the new Provincial Farm for Calabar Province at Obio Akpa, Abak. This farm, 260 acres in extent, is on acid sand soil typical of the area : it is steeply undulating and the layout has therefore been planned with the object of obtaining optimum soil conservation. A number of buildings have been completed and others are in course of construction. The acquisition of the site for the Oil Palm Research Sub-station nearby has also been completed, not without further trouble, and development work is proceeding there also.

*One Senior Agricultural Officer to be transferred shortly.

7. The possibility of opening further Provincial Farms in Rivers Province and in Cameroons Province has not been lost sight of but actual work on these will have to be deferred until the staff situation improves. The Senior Agricultural Officer, Umuahia, carried out an inspection of the Creek areas with the object of selecting a site for the Rivers Province farm and has made useful recommendations. Similarly, preliminary negotiations have been made regarding a site for a Cameroons Province farm near Kumba. That there is urgent need for more work in both these areas is patent.

8. A survey of suitable land for the setting up of a Rice Research Station in Ogoja Province was undertaken and a promising site selected. Negotiations for acquisition have been initiated.

9. Land has been secured for extending Bambui Farm, Bamenda. The new area which is 750 acres in extent is all above 5,000 feet and will enable more work to be done on stock and pasture improvement and on mechanised agriculture.

10. Further development of the small Demonstration Farm Centres took place, although two previously started have had to be abandoned for reasons beyond our control. Demonstration Farm Centres are situated as follows :—

Akwete, Ohoba and Abor	Owerri Province
Ukpabi	Onitsha Province
Banso	Bamenda Province
Oron	Calabar Province

They are designed to serve as foci for extension work and have aroused interest among local farmers and others. As part of our propaganda work, visits of groups of farmers and others to these centres are encouraged. Experience is showing that these centres will not fulfil their functions unless they receive careful supervision and a rapid expansion cannot be expected until the staff situation becomes easier.

THE 1949 SEASON

11. The dry season was severe and prolonged but the late rains more than made up for earlier deficiencies. While in some districts crops were adversely affected by the late planting season, rice benefited considerably from the excellent late rains. Price levels of foodstuffs, in the earlier part of the year particularly, were in general far in excess of those which have come to be regarded as normal in the Eastern Provinces. While the dry weather in the early part of the year probably adversely affected the cassava crop to some extent, it is thought that the high prices were more a reflection of the increased prices paid for palm produce and indicated a general inflationary trend.

12. The amount of gari railed to the North showed a sharp decline during the months March to June, the 1949 figures being 1,251 tons as compared with 5,374 tons for the corresponding period in 1948.

13. A shortage of foodstuffs just prior to the harvesting of the first yams in Ogoja Province where yams are grown as a cash crop, was reported to be due to the practice of selling the yam crop in the ground to traders before harvest without thought of saving a sufficient stock for consumption.

14. The yam beetle (*Heteroligus claudius* Klug) caused damage in localised areas in Onitsha and Calabar Provinces. An investigation is proceeding. Yam and cassava yields were below average in Owerri Province.

15. Typical rainfall records are given in the following table :—

Month	Umuahia		Uyo		Nkwelle-Onitsha		Abakaliki		Bamenda (Bambui)	
	1949 ins.	27 years Average ins.	1949 ins.	12 years Average ins.	1949 ins.	18 years Average ins.	1949 ins.	35 years Average ins.	1949 ins.	4 years Average ins.
January ..	0.01	0.97	0.30	1.11	—	0.53	0.12	0.63	—	0.99
February ..	0.14	2.13	0.06	3.37	0.37	1.28	0.54	1.19	0.36	1.28
March ..	5.65	4.58	4.23	4.04	2.35	2.20	2.96	3.35	2.40	2.28
April ..	8.88	8.01	9.74	3.16	3.58	6.20	3.20	5.88	6.81	8.66
May ..	11.46	10.24	8.56	11.13	7.69	8.63	6.75	9.65	12.39	8.16
June ..	13.41	12.58	22.06	9.62	11.54	10.14	13.03	10.69	10.63	11.69
July ..	15.43	11.40	14.03	11.77	8.04	10.94	17.77	10.79	14.84	13.45
August ..	11.76	11.44	16.94	11.12	4.59	8.64	11.45	10.43	17.10	12.93
September ..	15.63	13.70	17.57	13.58	18.51	11.49	24.80	14.07	28.05	15.95
October ..	12.84	11.42	18.57	11.30	6.47	9.90	12.35	11.96	13.27	10.67
November ..	2.55	3.40	5.58	5.57	0.58	2.31	1.24	2.15	2.69	1.53
December ..	—	0.80	—	1.78	0.04	0.46	—	0.49	—	1.72
TOTALS ..	97.76	90.67	117.64	86.55	63.76	72.72	94.21	81.28	108.54	89.31

ANIMAL HUSBANDRY

16. *Cattle and Sheep*.—The Bamenda Highlands, with their wide areas of good grazing, absence of tsetse fly, and all-season water supplies are the most promising areas in the Region for cattle development. The object of the cattle breeding work in Bamenda is to produce an animal suitable for mixed farming purposes ; the qualities required being a robust constitution for draft work and a good milk yield.

17. The herd of Zebu cattle at Bambui and Santa farms consists of 198 head, a net increase of thirty-eight during the year. As a result of previous experience the stud bulls are now confined to the Gudali bull of the Ngaundere type (ex Esosong) which is already in use, and a new bull of the local type ex Jakiri to replace the White Fulani (ex Shika) and the Gudali (ex Jakiri) of the Banyo type. Additional cows have been bought from good quality Gudali herds in the area and a number of cows have been culled. The need for culling is shown by the fact that the lowest yield is 400 lb per lactation and the highest 3,550 lb, the average being 1,380 lb for ninety-seven lactations. The acquisition of an extension of 750 acres in the upper part of Bambui Farm will facilitate breeding by providing accommodation for a much larger herd and, at the same time, will permit of increased work on pasture and controlled grazing.

18. At Umudike the dwarf cattle have not been doing well, mainly owing to the heavy incidence of Trypanosomiasis with which the herd is constantly re-infected by passing trade cattle. The natural resistance of the farm cattle does not appear to be capable of withstanding these continuous attacks which are a feature of Umudike Farm. At Abakaliki, one N'dama bull free of contagious abortion has been obtained from Oyo for crossing with the main herd of abortion free local dwarf cattle. These latter are becoming increasingly difficult to purchase due to high prices and the reluctance of farmers to sell cattle of this type, which are kept mainly for ritual purposes.

19. A promising feature at Abakaliki has been the flock of local sheep which has thrived and which promises to prove very profitable. Rotational grazing and cutting of grass together combined to produce a satisfactory sward of K'yasuwa grass (*Pennisetum pedicellatum*) during the wet weather.

20. *Pigs*.—The pigs of European breeds kept under fly-proof conditions have continued to do well at the Government Farms at Umudike, Nkwelle and Abakaliki. It has been found

possible to meet all the requirements of approved local pig-keepers and to sell a surplus locally as fresh meat and to the Cold Store at Enugu. The problem of providing the correct economical rations, which include a good proportion of protein-containing concentrates imported from other Regions, is constantly under review. In this respect, pig-keeping in Bamenda Province has many factors in its favour, as a balanced ration can be obtained comparatively cheaply from foodstuffs grown within the Province. It is still possible in spite of rising prices of certain foodstuffs, to rear pigs at a profit provided full care and attention are given to the business. This attention is not always apparent among private owners of piggeries, far too many of whom are of the 'absentee' type.

21. With local pig-keepers working on a small scale the keeping of a boar for stud purposes is not economic. The actual cost of food for a boar at Nkwelle Farm was 2s 6 $\frac{3}{4}$ d a week. In view of this, it was decided that no new pig-keeper will be supplied with breeding stock until he has given satisfactory proof that he is thoroughly capable of rearing weaners. The cost of raising one weaner has been worked out at 14s 11 $\frac{1}{2}$ d for food only and a standard charge of £1 is made for each weaner issued.

22. The economics of pig-keeping under these conditions can be assessed from the following figures which are based on costs at Nkwelle Farm :—

<i>Cost of Weaner :</i>							£	s	d
Cost of food to rear one weaner eight weeks old to 200 lb live weight at twenty-eight weeks of age							1	0	0
<i>Cost of food for weight increase :</i>							£	s	d
25 lb to 40 lb live weight	..	..	..	..	..	0	5	10	
40 lb to 100 lb live weight	..	..	..	..	..	0	13	6½	
100 lb to 200 lb live weight	..	..	..	..	..	1	12	0	
							2	11	4½
Total cost							£3	11	4½

This figure is exclusive of capital charges and labour costs, but it would not be greatly increased in a private piggery where the work is mainly done by the owner.

23. The standard selling price of pigs for slaughter is 1s a lb live weight. The value of a 200 lb pig is therefore £10. Given efficient management, pig-keeping on the basis of purchasing and fattening weaners should therefore be very profitable.

24. Strangely enough, the policy of issuing weaners has not proved popular since the possession by local pig-keepers of a boar and sows of European breeds has considerable prestige value and it may be necessary to revert to the earlier practice of selling breeding stock in spite of the fact that this is less profitable to the owner.

25. *Poultry.*—Owing to quarantine restrictions at the Poultry Breeding Centre at Oyo, it has not been possible to adhere to the programme for increasing the supply of new strains of Rhode Island Red poultry in the Region. Unfortunately, a rigorous culling of the existing stock was undertaken in anticipation of the arrival of fresh stocks and our position at the end of 1949 is not so good as it was last year. The local demand for pure-bred poultry is considerable and the desirability of starting a central poultry breeding station within the Region is becoming apparent.

26. At Umudike Farm, Muscovy duck-keeping continues to be successful and profitable : 120 eggs and twenty-two ducklings were sold during the year. Four geese and a gander

have been purchased and are kept at Umudike. Eggs have been laid but so far no successful hatchings have been secured.

27. *Fodder Crops and Pastures*.—In the acid sand soils of Owerri, Calabar and Rivers Provinces where a shrub fallow, preferably of *Acioa*, plays an important part in crop husbandry and where trypanosomiasis infection renders mixed farming impracticable except under fly-proof conditions, fodder crops are of more importance than pastures. Our main object in these areas is to increase the productivity of fodders by good management and by manuring. A small trial has been laid down at Umudike Farm to determine the amount of Napier Grass and Elephant Grass that can be secured by intensive management with applications of farm-yard manure at the rate of up to 40 tons per acre per annum. The small plot of Brazilian lucerne has continued to do well and has been extended.

28. At Abakaliki, where the gravelly and lateritic soil is not favourable for the growth of *acioa* as a bush fallow, an attempt is being made to establish pasture grasses in alternation with crops, using sheep for grazing. Excessive grass growth will be cut and used for silage. Various methods of pasture establishment and treatment will be tested.

29. In Bamenda Province, the newly introduced Kikuyu grass is appreciated by Fulani herdsmen for planting on old kraals, though it needs careful establishment. Experimental work in this Province will show whether it is possible to introduce a better short, spreading grass than the existing coarse and tufty variety of *Sporobolus*.

SOIL FERTILITY

30. The soil fertility problems of the Eastern Provinces, accentuated by the increasing population, have been frequently described in previous Annual Reports and no useful purpose will be achieved by describing them once again. The work of the Agricultural Department has been concentrated on experiments with artificial fertilisers, lime, shrub fallows, and organic manures including night-soil compost. The significance of the problem is understood by only a small fraction of the population and emphasis has therefore been placed on the need to demonstrate the results of applying lime and artificials over a wide area. The success of these demonstrations which still affect only a small proportion of the population has been sufficient to warrant the consideration of distribution of lime and artificial fertilisers on a commercial scale. It seems very likely even at this early stage of extension work that farmers will be willing to purchase artificials ; but there is naturally some doubt as to whether the sale of lime will be as easy, for the results of its application are not so readily apparent to the eye.

31. *Artificial Manure Demonstrations*.—A determined effort was made during the year to demonstrate on as wide a scale as possible the advantages of applying artificial manures with lime which have been fully proved by experiment. The results of the large number of demonstration plots laid down have been highly successful and very large numbers of applications for similar free demonstrations in 1950 have been received. Plots have ranged from 1/40 to 1/10 acre in size and most have been sited on farmers' own lands ; a number have, however, been sited in school gardens. The treatment, which has been uniform, has consisted of an application of lime at the rate of 10 cwt per acre broadcast at the time of preparation of land, followed after germination of the yam crop by a "placement" dressing of a mixture consisting of :—

1½ cwt Sulphate of Ammonia

1½ cwt Superphosphate

¾ cwt Muriate of Potash

per acre. The mixing and bagging of the artificials was done at Umudike Farm, Umuahia. The co-operation of farmers was very gratifying and the following number of plots laid out :—

Onitsha Province	..	..	..	..	..	..	..	420
Calabar Province	..	..	..	..	..	..	..	218
Ogoja Province	..	..	..	..	..	..	..	331
Owerri/Rivers Provinces	..	..	..	..	..	..	..	370
Total	..	..	..	..	..	..	..	<u>1,339</u>

32. An attempt was always made to have, and in most cases it was possible to arrange for, an adjacent untreated plot for comparison. In each Province a number of suitable demonstration plots were selected and the crops of yams weighed at harvest from the manured and controlled plots. These harvestings were given as much publicity as possible and neighbouring farmers were encouraged to come and see for themselves the effect of the treatment.

33. In Owerri/Rivers Provinces, the results have shown increases of 40 to 60 per cent. In Onitsha Province, 120 of the yam plots were weighed at harvest. One plot showed 400 per cent increase and thirty showed 100 to 250 per cent increase. Farmers expressed satisfaction with the greater proportion of ware yams obtained.

34. In Ogoja Province, yields were recorded on twenty-two of the plots in Afikpo Division. The average net yields per acre were :—

<i>Manured Plots</i>	<i>Unmanured Plots</i>	<i>Increment</i>
10, 969 lb	8,551 lb	2,418 lb

The market price of yams at harvest was £8 per ton. The artificial manure mixture was assessed at £28 10s 7d and lime from Awgu at £14 7s 8d per ton. The transport and distribution costs to this district were excessively high, amounting to 36 and 77 per cent respectively of the total assessed value. However, assuming that the lime has a beneficial effect lasting three cropping periods in a four-year rotation, i.e., nine years, a net profit is still arrived at. Moreover, should commercial distribution of artificials and lime be undertaken the cost of transport would be very considerably reduced. It is confidently expected that given efficient distribution, with artificial manures alone, a return of 100 per cent profit on the cost of the artificials would be secured on the yam crop only. An interesting sociological point arises in this connection. In many areas in this Region the man of the family undertakes the heavy work on preparing hills or ridges for the planting of yams and does the actual planting. Subsequently the farmers' wives undertake the weeding and also plant intercrops such as maize, fluted pumpkin, beans and cassava. These intercrops are customarily the property of the wives : but they also benefit by the application of artificials and lime and the total value of increased crops is thereby enhanced. The man will, however, be the person who will have to pay for the manures and, as he only secures the yam crop, it is that crop which must show a profit sufficient to justify the expenditure on artificials.

35. *Experiments with Artificials.*—The artificial experiments started in 1948 on farmers' plots were carried to a conclusion. Results were variable as was to be expected, but significant increases were generally obtained with sulphate of ammonia.

36. *Lime.*—Experiments conducted over a long period of years have proved that a single dressing of 10 to 20 cwt per acre of locally burnt lime will produce an appreciable increase of yield. The effect of this dressing may be felt for ten to fifteen years after application which may also be combined with other means of maintaining fertility.

37. In view of high transport costs a preliminary trial has been laid down to determine if small dressings of lime will have any significant effect on yields, the intention being to supply calcium as a nutrient rather than to attempt to change the reaction of the soil.

38. Demonstrations of the application of lime alone were given on ninety-nine compound farms in Calabar Province. Two hundred and fifty-four samples were taken and only seventeen cases did not show a lime requirement. In the majority of cases, a pH value of less than 4.5 was recorded with a lime requirement of 1 to 2 tons per acre. In all, $21\frac{1}{2}$ tons of lime were applied on plots varying from $\frac{1}{10}$ to $\frac{1}{8}$ acre at an average rate of 1 ton 14 cwt per acre with a no-limed plot marked off alongside. Though it was not possible to record the results by weighing, the effect of the lime was in some cases very obvious. It is felt that there is scope for the application of lime alone to those lands which normally receive a quantity of household refuse, etc., and which tends to maintain the level of other plant nutrients in the soil.

39. The lime crushing plant referred to in the last report has arrived but has not yet been assembled. Its capacity is estimated to be 10,000 tons crushed lime per annum.

40. *Organic Manures, Improved Shrub Fallows and Night-soil Compost.*—The position of farm-yard manure and improved shrub fallows in the farming system of the Eastern Region was summarised in the 1948 Annual Report. Further experimental work was undertaken at Nkwelle and Umudike on *Acioa barteri*, the best fallow-shrub so far found. There are indications that acioa is not so effective on gravelly and rocky soil as it is on acid sands. Exposure of the roots showed that they did not penetrate deeply in rocky soils and that may be the factor concerned. In acid sand soils, however, it continues to give excellent results and its use by farmers is extending.

41. One experiment at Umudike was designed to test how long acioa will continue to pump nutrients to the surface. The shrub was originally planted in 1938; from 1943 onward the yield of leaves exclusive of seasonal leaf fall was recorded and also the ash from the branches, the leaves being used in compost or bedding for ultimate return to the soil. The average amount of branch ash returned to the soil annually was 573 lb per acre and of leaves 6,752 lb per acre. The branch ash and leaves were analysed chemically and it was found that from 1943 to 1948 the acioa was capable of bringing to the top soil the equivalent of approximately £13 of lime and artificial fertiliser based on current costs, delivered Umudike Farm. The need for extending the use of this shrub is obvious. Another experiment has been designed to reconcile the use of acioa with mechanised cultivation by contour planting at different spacings.

42. Improved quality night-soil compost is now being made in conjunction with Sanitary Authorities in Enugu and Aba. At Enugu the product is on sale at 12s 6d per ton. At Abakaliki Farm, it is aimed to produce 200 tons good compost each year. Some thirty sheds each thirty feet long have been erected on 12-foot broadbased terraces, and compost is made on these instead of in pits. The bulk of the compost which includes animal manure, consists of layers of freshly cut grass composted in 4-inch layers. To this is added a sprinkling of sulphate of ammonia, some completely composted material as 'starter' and plenty of water. A little lime is applied at the first turning and the process is finished in three months. About 4 tons of fresh grass are used in each heap, 330 gallons of water, $\frac{1}{2}$ cwt sulphate of ammonia and 2 cwt of old compost.

OIL PALM INDUSTRY

43. *Production and Export.*—The season has again been a successful one and the gradings of palm oil are the highest ever recorded. The high and stable prices and improved availability of consumer goods have undoubtedly contributed to the boom in production. The following

table compares the figures for graded produce from the Eastern Provinces for the last three years :—

						<i>Palm Oil</i> tons	<i>Palm Kernels</i> tons
1947	..	..	..	..	..	130,941	163,328
1948	..	..	..	..	..	141,196	179,199
1949	..	..	..	..	..	144,276	175,734

Figures for the railings of palm oil to the Northern Provinces were 7,128 tons compared with 9,372 tons railed in 1948.

44. *Oil Palm Cultivation*.—Steps are being taken to increase greatly the number of high yielding oil palm seedlings available for distribution to farmers. Falling yields in OPRS. seed-production plots have been rectified by application of manures but specialised staff required for the selection of additional seed trees is still a limiting factor. The effect of the improvement in the supply position will not be felt immediately as approximately three years may elapse from pollination until the seedling is ready for planting in the field. About 390,000 seeds were put into germinators during the year ; of these, after allowance for losses, up to 50 per cent should be available as plants in 1951.

45. *Oil Palm Machinery*.—There has been a small improvement in the supply of palm presses, a shipment of eighty presses being sold without difficulty. A later shipment of 120 arrived with an essential part missing. An additional 1,000 presses are on order. In order to prevent 'black market' operations, an arrangement has been made whereby presses are sold only to possessors of permits issued by Agricultural Officers. The delay in delivery is exasperating as the demand for presses is extremely heavy. The spare part situation has improved and it is now possible to repair some of the many presses out of order ; at one time during the year, 145 out of 1,344 presses in the Region were in need of repair.

46. *Oil Palm Survey*.—The oil palm survey at Nung Udoe in Uyo Division of Calabar Province described in paragraph 17 of the 1948 Annual Report has continued. Five thousand oil palms have been classified into six cultural groups on eighty-three separate plots each about one acre in extent. Fifty-two of these plots have now been recorded for a full year. They contained 3,686 palms of all ages from which 4,427 bunches averaging 31.04 lb each were harvested. This gives an average yield of about 2,600 lb bunches per acre which is low and less than was expected, since by far the greatest number of plots are in typical palm groves. This work is carried out in conjunction with the Oil Palm Research Station, Benin. The results will be of great value in determining the economics of local palms grown under natural conditions.

OTHER CROPS

47. *Linseed*.—Trials in Bamenda Province indicate that this crop will only produce satisfactory results at elevations above 5,000 feet and then on inherently very good or heavily manured soils. A newly introduced strain, Canada Royal, appears likely to be more satisfactory than the original Nughen strains from India.

48. *Coffee*.—The cultivation of Arabica Coffee in Bamenda Province is being extended. A survey of coffee farms in this Province was completed during the year and gave a total of 565 acres owned by 948 farmers. Some farmers purchased cattle for the purpose of manuring their plots.

49. *Cocoa*.—The potentialities of cocoa cultivation in the eastern part of Ogoja Province, in the Cameroons Province, in Mamfe Division of Bamenda Province, in parts of Bende Division of Owerri Province and in parts of Calabar Province are considerable. The promising experimental cocoa plot at Alankwu near Obudu has been extended. Small quantities of

budwood of the recently imported promising strains of Upper Amazon cocoa were obtained with some difficulty and about twenty plants were successfully budded. An attempt to germinate seed of these varieties which had been imported from the Gold Coast by air, packed in charcoal, failed. Similar experimental plots have been established at Sumba in Mamfe Division and at Ikom ; others will be established in suitable districts. It is hoped in these small experimental areas to build up a nucleus for the supply to the Eastern Region of all improved types of cocoa so that importations from western areas can be prohibited and the risk of the introduction of Swollen Shoot Disease minimised. Exports of cocoa from the Eastern Provinces and Cameroons amounted to 4,836 tons compared with 2,544 tons in 1948.

50. *Rice*.—The 1949 Swamp Rice season was extremely favourable and the crop greatly benefited from the good late rains. It is estimated that in Onitsha Province the acreage under paddy rose from 9,000 to 16,000 acres, though yields suffered in some places owing to neglect. In Ogoja Province the estimated acreage is 13,560 compared with 9,000 in 1948. Extension work services were mainly confined to distributing pure G.79 seed grown at Provincial Farms.

51. There is some indication that in the 'bottom' lands or inland swamps of Ogoja Province where rice has been cultivated for four or five years in succession, there has been some falling off in yield. Preliminary manurial experiments were therefore laid down at Abakaliki and at Iboko. A positive response to phosphates was observed but the results of the experiments are not yet available. Further manurial experiments with both artificial and green manures are planned for 1950. At the same time demonstrations will be laid down on farmers' paddy fields as has been done with yams.

52. A number of introduced varieties have been tried at Abakaliki and in the Mensham Valley of Bamenda. The Indian varieties—Lolanzan and T21—gave excellent yields of 2,300 and 2,200 lb paddy per acre respectively in Bamenda. At Abakaliki two Ceylon varieties—Pachchai Perumal and Vellai Illankalayan—gave 2,409 and 1,130 lb paddy per acre respectively.

53. Work on demonstrating the opening of swamps by hand has been undertaken at Massagha near the Bamenda-Cross River-Calabar Scheme and at Iboko near Abakaliki. The Massagha Swamp yielded 1,500 lb G.79 paddy per acre over 32 acres. It is intended to introduce tractor cultivation at Iboko and to demonstrate the improvement of the control of water by simple methods.

54. *Rice Mills*.—Three No. 7 Planter's Mills are now in operation. Owing to an engine breakdown at Otu-Ocha none has yet worked for a whole year at full production but with the reopening for the new season's crop they have proved very popular and several inquiries regarding purchase by private enterprise have been received. The gross trading profits (excluding depreciation or amortisation of capital) for the last quarter of 1949 have been Otu-Ocha, Onitsha Province, £112 15s 6d ; Abakaliki and Okpoha, Ogoja Province (together), £235 1s 9½d ; an average of approximately £112. A further mill is under construction in Ogoja Province.

55. *Cinchona*.—Work has been confined to the maintenance of approximately 3 acres of observation plots at Bambui Farm, Bamenda, which contain eleven strains of hybrid plants grown from Amani seed.

56. *Fibres*.—The study of the propagation, cultivation and economics of *Clappertonia ficiifolia*, an indigenous fibre growing in swampy areas, was begun mainly in Calabar Province. Investigations into retting methods were conducted and samples prepared for spinning tests.

57. Though this fibre has been known for a time to have considerable promise as a sack fibre, little was known about it. It has now been shown that the plant which is perennial,

can be grown from cuttings as well as seed and that it may grow to a height of 18 feet. Another useful characteristic of the plant is that it may be ratooned. The fact that its natural habitat is fresh water swamps, particularly in Calabar Province, means that it should not be necessary to use good farming land for its cultivation.

58. *Jute*.—Small-scale trials were carried out during the year with two species of jute, *Corchorus capsularis* and *C. olitorius* from imported seed. The trials were necessarily on a small scale as very little seed was available and it was desired to try out as wide a range of conditions as possible. The plants did not thrive on acid sand soils but good growth was secured in heavy soils, particularly in those where there was a plentiful supply of soil moisture. Soils which are suitable for paddy appear equally well suited for jute. Plants in such conditions often attained a height of about 6 feet while the average height was about 5 feet. Further trials will be undertaken.

59. *Tetracarpidium Conophorum*.—Extensive trials of *Tetracarpidium conophorum* have shown that in general the plant is difficult to establish in the Eastern Provinces even where shade conditions are favourable. It will, however, thrive under conditions of good rainfall and suitable shade, as found in parts of Owerri and Rivers Provinces, which ameliorate an otherwise severe dry season. Future trials will be confined to these areas.

60. *Fruit*.—9,935 citrus trees were distributed compared with 7,956 in 1948. Nigerian green orange is still the most popular variety required. Amongst other plants issued were 1,976 kola trees, mainly in Owerri Province. The United Africa Company opened a factory at Umuahia for the extraction and export of juice of the local Nigerian green oranges. This venture is expected to give further encouragement to the planting of citrus.

61. *Miscellaneous Crops*.—Introductions of tea, a new variety of potato named "Blisso Triumph", and Nigerian wheat are being tried at Bambui Farm, Bamenda, but further work on pyrethrum is likely to be restricted now that the new and efficient synthetic insecticides are becoming so readily available.

62. *Botanical Work*.—Citrus root-stock trials are being laid down at Umudike. Work on the selection of pulses and the multiplication of mosaic resistant strains of cassava have continued. Full reports of this work will be found in the report of the Botanist, Ibadan.

MISCELLANEOUS

63. *Agricultural Engineering Branch*.—First trials of agricultural machinery took place at Abakaliki Farm where the main workshops are under construction. The Fowler Diesel Tractor performed satisfactorily under the supervision of the Mechanic-Demonstrator who arrived during the year and valuable experience has been gained with the various implements employed. Trials of the Ferguson Tractor have been delayed owing to pilferage during transit of essential parts which have not yet been replaced.

64. It is proposed to use tractors for cultivating the 20 acre rice multiplication farm at Iboko and the area has been stumped for this purpose. There appears to be a promising future for the mechanised cultivation of inland rice swamps in Ogoja Province, some of which are of considerable extent.

65. *Soil Conservation*.—Work on the control and prevention of gully formation continued at Agulu and some villages have carried out anti-erosion measures voluntarily. Experimental farms and demonstration centres increasingly stress conservation measures ; it will be necessary, however, when more staff is available, to draw further attention to the damage to soils caused by indiscriminate burning, especially late in the dry season.

66. *Bamenda-Cross River-Calabar Scheme*.—The Department continued its connection with the Bamenda-Cross River-Calabar Scheme in an advisory capacity.

- (a) *Palm Planting*.—Improved seedlings supplied to date for the 1,000 acre plantation have been as follows :—

1946	..	..	..	..	24,000 for planting in 1947
1947	..	..	..	..	28,000 for planting in 1948
1948	..	..	..	..	50,456 for planting in 1949

21,451 seedlings were planted in 1949, bringing the total acreage planted to 828. The remaining 172 acres for which sufficient seedlings are available will be planted in 1950.

- (b) *Mile 25 Settlers*.—The eleven settlers have not proved satisfactory and the maintenance of the 5 acre oil-palm blocks has been taken over by the Planning Authority.

- (c) *Mile 30 Kwa Falls*.—In spite of political difficulties, 106 holdings have been demarcated and sixty labourers have been selected and settlement has started with a newly planned model farm to guide them.

67. *Training of Ex-servicemen*.—Five ex-servicemen left Bambui Farm, Bamenda, to start work on their mixed farms and have made satisfactory progress. Six more are in training at Bambui and a further six are in training at other Provincial Farms. Six men who began in 1948 on these farms passed out of the training school during the year.

Oil Palm Research Station

I.—ADMINISTRATION AND DEVELOPMENT

The development of the station has continued at an increasing pace and much progress has been made with buildings and other capital works. Administrative affairs have consequently taken up a very great deal of the available staff time. On the research side progress is still considerably hampered by the shortage of specialist staff.

2. *Finance*.—For three years the station has been financed from a research grant of £152,160 provided by the United Kingdom under the Colonial Development and Welfare Act, with concurrent expenditure from development funds provided by the Nigerian Government. At the beginning of the period under review only £42,000 remained from the money provided under the research grant. The Nigerian Oil Palm Produce Marketing Board thereupon undertook to continue the financing of the station as soon as this sum was exhausted, and the Board voted a sum of £530,608 which, it was expected, would cover the Station's expenditure for a further three years.

3. *Staff*.—The officer-in-charge is the only substantive appointment to the staff, but four Botanists from the Agricultural Department's cadre of specialists were posted for duty at the station. In addition the Administration seconded two Development Officers.

4. Allowing for leave incidence the average number of Senior Service staff on duty was about five. Seven specialist appointments of various types remained unfilled.

5. The established Junior Service staff totalled seventy-four by the end of the year. An average labour force of about 780 men was employed at the main station near Benin, and a force of about 160 men at the sub-station near Abak. In addition, over 100 labourers were employed at various other stations, bringing the total labour force employed by OPRS. to over 1,100.

6. *Construction Programme*.—Further progress was made in the construction of the numerous buildings required, but the programme is still very much in arrears. The programme has been carried out by two resident Inspectors of Works of the Public Works Department, with occasional supervision from the Provincial Engineer in Benin. Three houses for senior staff were completed bringing the total number ready for occupation up to five. Two more were under construction. Two rest-houses of the chalet type were built for touring officers.

7. Good progress has been made with the building of houses in the model village for Junior Service staff. The village has been named *Isiurwa*, meaning "the source of prosperity," by the Oba of Benin. At the end of the year one "A" type, five "B" type, 12 "C" type and 128 "D" type houses were available for occupation and many more were under construction. The "D" type quarters are eventually intended for labourers, but the shortage of accommodation at OPRS. is so acute that they are at present being used for more senior staff.

8. The finishing touches were put to the pathology laboratory. A chemistry laboratory was completed and good progress was made with a physiology laboratory. Offices for the Agronomist and the Plant Breeder are under construction. A number of other buildings, including a large fertiliser store, has also been started.

9. There has been no improvement in the water supply, the station being still dependent on rather uncertain temporary plant. The engines and some of the piping for the permanent system have arrived, however. No progress was made in installing an electricity supply.

10. *Planting*.—A further 60 acres of palms were planted bringing the total planted area up to about 735 acres. The greater part of the 1949 planting was for a fundamental manurial trial.

11. Planting continues to be very successful and it appears that the difficulties experienced a few years back have been completely overcome. This has been achieved by planting out all palms with a "ball of earth", a somewhat laborious and expensive undertaking where large areas are concerned but one which is amply justified by the results obtained.

12. *Palm Fruit Yields at Oil Palm Research Station*.—The average yields of fruit bunches obtained at OPRS. from all areas planted at normal spacing are given in the following table. The yields are given in terms of age of plantation, the latter being reckoned from the time of planting out into the field, e.g., an area planted in 1940 is reckoned to be eight years old during 1948.

Yield of Palms according to age at OPRS. (in No. and weight (lb) of bunches per acre)

<i>Age of Plantation</i> (years)						<i>Area*</i> (acres)	<i>Number</i>	<i>Weight</i> (lb)
4	..	..	..	..	..	38.8	334	910
5	..	..	..	..	..	182.0	351	2,019
6	..	..	..	..	..	182.0	410	4,120
7	..	..	..	..	..	182.0	420	5,565
8	..	..	..	..	..	95.6	382	7,031
9	..	..	..	..	..	38.8	341	7,530

* This is the area on which the average is based.

13. *Sub-station*.—The negotiations for the acquisition of a small area of land in the Abak Division of Calabar Province to serve as a central sub-station were finally completed, and the acquisition notice was published in the Gazette on 7th July, 1949. At this sub-station important cultural experiments and progeny trials will be carried out under the conditions of the main palm belt. A very useful area of 450 acres has been obtained, about half of which may be regarded as typical "palm grove". The latter will be of the greatest value in carrying out experiments on the improvement of such groves which, of course, give the greatest part of the country's production of oil palm products. Yield recording of the palm grove areas has been started. Unfortunately the Public Works Department were unable to make a start with the building programme at the sub-station.

14. *International Conference*.—An International Conference on oil palm research was held at OPRS. from 3rd to 14th December, 1949. Belgian, French and Dutch delegates participated as well as the OPRS. staff and representatives of commercial estates in this country. The opportunity thus presented of discussing in a friendly and informal manner the many problems presented by the oil palm as a crop proved of the greatest value.

II.—RESEARCH

15. *Agronomy Division*.—The Agronomist was largely occupied with the programme of work in the Eastern Provinces, but during the absence of the Plant Breeder on leave it was necessary for him to supervise the work of that Division. This included the daily supervision of the pollinations for the new breeding programme.

16. *Establishment of Palms*.—The average germination of all seed sown in July 1948 was 72 per cent at nine months, after which time the seeds were removed from the germinators. This is one of the best results ever obtained, but the seed sown in July 1949 promises to give even better germination, the average figure after seven months being 74 per cent as compared

with 70 per cent in 1948. The new water-heated germinator was finally brought into use in November 1949 and is so far giving very good results.

17. The watering of all nurseries during the dry season at a rate of one gallon per seedling per week has been made a routine practice, and total losses are now in the region of 10 to 15 per cent. An experiment carried out in 1948 to test various shading and watering techniques indicates that in the dry season shading and regular watering are necessary to keep down losses of seedlings to this low level.

18. A summary of seed sown and seedlings planted in the nursery in 1949 is given below:—

					<i>Seed sown</i> 1949	<i>Seedlings planted</i> 1949 (<i>sown 1948</i>)
(i)	Standard <i>dura</i> palm	..	..	..	8,165	1,538
(ii)	Seed for Cultural Experiments	..	..	..	51,647	6,852
(iii)	Extension Work Seed	..	..	..	24,148	6,153
(iv)	Miscellaneous Seed	..	..	..	39,080	23,190
Total					123,940	37,733

19. *Experimental Work at OPRS.*—Cultural experiments already in progress were continued and the following new experiments started :—

- (i) *A Nursery Experiment* to test technique, to repeat that laid down in 1948 and to check the results from that experiment.
- (ii) *A Seedling Selection Experiment* to test whether selection of vigorous seedlings at the nursery stage is of later benefit.
- (iii) *A Bunch Refuse Experiment* to try out various methods of applying the waste bunch stalk from the factory as a fertiliser. This was laid down on an area of palms planted in 1947.
- (iv) *A Fertiliser Experiment* to test factorial combinations of inorganic and organic manures. Fifty acres of selected *dura* palms were planted in 1949 to bring up the total area for the experiment to 100 acres, the other half having been planted in 1948. Fertiliser application will commence on all palms in 1950.

20. The Fertiliser and Fallows Experiments on arable crops started in 1947 by the Chemists of the Agricultural Department have now been taken over by the Agronomy Division.

Experimental Work at Outstations—

21. *Sub-station.*—Although not formally acquired until August 1949 it was possible to record the individual yields of all palms in the palm groves in the area throughout the whole year, thanks to the co-operation of the owners of the land. In all, about 200 acres of grove are being recorded, and a further 200 acres of land are available for planting palms. A nursery was established in May 1949 with seedlings from OPRS., and these seedlings will be ready for field planting in 1950.

22. *Farmers' Plots.*—A large programme of work was planned for the farmers' plots of oil palms taken over on a ten-year lease in 1945, but owing to staff shortage it was only possible to start the following experiments in 1949 :—

- (i) *Fertiliser Experiments.*—Three twenty-seven-plot factorial experiments with PK. and lime each at three levels at Ehor (Benin Province), Imo River (Owerri Province) and Awka (Onitsha Province).

- (ii) *A Frequency of Application of Potash Experiment* at Akwete (Owerri Province) to test the optimum method of applying soluble fertilisers under the heavy rainfall conditions of the main palm belt.
- (iii) *A Regeneration Experiment* at Achi (Onitsha Province) to test methods, including heavy dressings of fertiliser and the planting of *acioa*, of bringing a very backward area of palms into better condition.

23. *Plant Breeding Division*.—The main features of the year were the beginning of a new breeding programme at OPRS., and the great interest shown in introductions of palms from Tropical America. Production of improved seed for farmers increased by 30 per cent.

24. *Breeding Programme*.—The programme has two main immediate objectives—the elucidation of the genetic relations between *dura*, *tenera*, *pisifera* and their intermediates, and the detailed examination of the *dura* × *pisifera* cross. Note is also kept of ‘interesting palms’. In the period August 1949 to March 1950, 546 male and female bunches from 141 palms were used. Setting of the bunches was not very good as pollen several months old had often to be used. A new standard palm to replace CA256 has been selected, and certain progenies of these and other palms are being raised so that the Pathologist may report on their resistance to various diseases.

25. *Introductions and Seed Exchanges*.—The Central American palm, commonly known as *Elaeis melanococca* but whose exact botanical name is in dispute, has been reported to cross readily with the oil palm *Elaeis guineensis* (Jacq.), and to possess certain desirable breeding characters. This has given a considerable impetus to our collecting various palm species. Seed of *Elaeis melanococca* was received from Colombia and Panama, and other species from British Guiana, Madagascar, Peru, Liberia and Zanzibar. Particular efforts are being made to obtain certain other genera related to *Elaeis* such as *Barcella*, *Bornoa* and various members of the Eucocoinaeae.

26. Many of these introductions were obtained in exchange for our own seed. A total of 36,000 improved and 1,060 breeding seed was sent to Sierra Leone, the Gold Coast, the Belgian Congo, the Sudan and Peru.

27. *Planting*.—The routine tests of Extension Work Seed were repeated, both the test for genetic segregation (6.5 acres, 618 palms) and the yield test (12 acres, 809 palms) being planted. The planting of the *idolatrix* variety in the Spacing-Intercropping experiment was completed. The object of this planting is to give information on the natural spread of pollen in the field. Supplying was again less than 1 per cent, although lack of maintenance increased losses in some areas.

28. *Improved Seed for Farmers*.—Total production of this seed (also known as Extension Work Seed) for the period 1st April, 1949 to 31st March, 1950 is given in the following table :—

			Ogba	Nkwelle	Umuahia	Ibadan	Total
<i>dura</i> × <i>dura</i>	..	..	221,008	34,274	29,009	18,413	302,704
<i>dura</i> × <i>tenera</i>	..	..	—	32,158	24,116	—	56,274
<i>tenera</i> × <i>dura</i>	..	..	185,938	—	—	9,140	195,078
<i>dura</i> × <i>pisifera</i>	..	..	204,178	37,667	22,608	12,220	276,673
Totals	..	..	611,124	104,099	75,733	39,773	830,729

29. It will be noticed that the year covered has been changed from the calendar year, as used in previous reports, to the financial year, to conform with the rest of this report. Production at Ibadan of seed for planting in the drier Middle Belt areas is now at the rate of

about 40,000 per year. No new areas have been utilised for seed production, but much of the preliminary work necessary for selecting further seed trees has been done for the plots at Aba and for the close-spaced areas at Ogba. The seed produced this year is estimated to be adequate for 4,000 acres of plantation in 1952.

30. *Fruit and Bunch Analysis*.—The experiment on variation in fruit composition was due to finish at the end of March when every bunch on the thirty selected palms over a period of two years would have been analysed, using five samples from each bunch. In order to eliminate end effects on the curves due to smoothing by taking running averages the experiment was continued for another two months, allowing a month's extension at each end. A seasonal fluctuation in fruit composition has been shown.

31. Bulk analyses of the Deli plantings in Field 5 have now been completed at quarterly intervals during the year. Average results are given in the table below :—

Parentage			Single Bunch wt. in lb.	Fruit Bunch	Single Fruit wt. in gms.	Meso- carp per cent	Shell per cent	Kernel per cent	Loss per cent
Deli (10 progenies)	..	..	21.0	0.65	9.6	54	32	10	3
Dura (3 progenies)	..	..	12.1	0.63	7.5	50	34	12	4
Deli F ₂ (ex-Ibadan)	..	..	16.3	0.63	7.6	52	34	11	4

It can be seen that the Deli is superior to the *dura* in fruit composition, judged on percentage mesocarp. The superiority would have been even more marked had unselected *duras* been included in the trial as with these the mesocarp averages only 40 per cent.

32. *Plant Pathology Division*.—During the period under review the laboratory was completed and this enabled a start to be made with work on oil palm diseases. Two problems of immediate importance studied were a vascular wilt disease associated with *Fusarium oxysporum* forma *elaeidis*, and a cortical root rot of nursery seedlings of undetermined cause.

33. *Fusarium Wilt*.—An isolate of *Fusarium oxysporum* forma *elaeidis*, taken from a twelve-year-old wilting oil palm at the UAC. estate at Calabar, was found to be pathogenic to six-months-old seedlings. Inoculation experiments are being planned on a large scale, using seedlings of known parentage, with the object of determining the range of resistance, tolerance or susceptibility to *Fusarium Wilt* in the oil palm, and the relation, if any, which may exist with fruit form and other morphological characters.

34. *Cortical Root Rot*.—The cortical root rot associated with “blasted” seedlings in the nursery was found to differ fundamentally from *Fusarium Wilt* disease. In the former, a cortical decay precedes invasion and necrosis of the vascular system. In *Fusarium Wilt* disease, the cortex of both root and stem remains white and sound in the early stages. The pathogen being confined to the vascular system, which becomes discoloured dark brown. The decay of the root cortex which follows later is secondary.

35. Various species of *Cylindrocarpon* and *Fusarium* have been isolated from the decayed cortex of affected roots as well as some Dematiaceous fungi. The same species have not been consistently isolated and some appear to be wound parasites.

36. The disease is noticeable only during the dry season when a large measure of control may be obtained by watering seedlings at the rate equivalent to 1.8 inches of rainfall per month. This suggests that the fungi isolated may be secondary in importance.

37. *Marasmius Trunk Rot*.—A fibrous trunk rot of twelve-year-old palms at Cowan Estate, associated with an undetermined species of *Marasmius* was one of two diseases

new to Nigeria recorded during the year. The same species was isolated from a rotting stem of a year old seedling in the "hardening off" bed in a nursery at the same estate. The fungus is a common saprophyte of fallen oil palm petioles which it covers with salmon-orange-coloured rhizomorphs. The fruit bodies are small white mushrooms the stems of which have a swollen base the same colour as the rhizomorphs.

38. *Anthraxnose*.—An undetermined species of *Gloeosporium* caused severe damage to the foliage of seedlings in a few of the raised trays at OPRS. The disease did not spread and the conditions favouring the outbreak are not fully understood. As this disease might prove serious, routine spraying with a copper spray is recommended for raised tray seedlings in future years.

39. *Biological Control*.—Investigations are in progress, with the co-operation of the Colonial Microbiological Research Institute, in the testing of oil palm fungous pathogens with antibiotics. The results of these investigations will be valuable in aiding the determination of the factors responsible for the distribution of diseases in the field.

Research and Experiments, 1949

STAFF

Mr Greenwood was appointed Assistant Director of Agriculture (Experiments) in June 1949 but owing to lack of staff it has been necessary for him to confine his activities mainly to work in the Northern Provinces. He has also had the responsibility of direct supervision of all the work of the Chemistry Division in these Provinces in the absence of a resident Chemist. Research work has thus again been handicapped by lack of staff during the year but it has been possible to carry out or continue about 200 experiments on our agricultural farms. Many of these are continuous experiments from which conclusions cannot be drawn until they have been concluded and no useful purpose would be achieved by mentioning them at this stage.

INVESTIGATIONS ON RAMA FIBRE

2. A series of experiments was carried out to investigate the possibility of growing Rama (*Hibiscus cannabinus*) as a commercial crop capable of producing a fibre suitable as a substitute for jute. Similar trials were carried out at Samaru, Bida, Ilorin, Maiduguri and Yola and the layout was in each case a $3 \times 3 \times 3 \times 3$ design with the following factors in all combinations :—

Spacing..	..	..	..	6 inches, 12 inches, 18 inches on 3-foot ridge
FYM. ..	..	..	..	0, 2, 4 tons per acre
Nitrogen	..	..	..	0, 50, 100 lb sulphate of ammonia per acre
Phosphate	..	..	..	0, 50, 100 lb superphosphate per acre

3. Results from these experiments, based on yield per acre and without regard to quality, have shown that the closest spacing is preferable. A good response to organic manure was obtained and increases of about 25 per cent were obtained by the application of two tons manure. The small applications of sulphate of ammonia and superphosphate also produced significant increase. Muriate of potash was also tried as a sub-treatment at some stations but produced no increase.

4. At Bida and Samaru Rama was compared with *Urena lobata* and in both trials Rama gave twice the yield of *Urena*. Further trials were carried out by the Botanical Section which included a yield trial with some imported seed and observations to ascertain the effects of delayed planting and of harvesting at different stages of maturity.

MAINTENANCE OF FERTILITY

5. Four experiments were started in 1949 dealing with the question of maintenance of soil fertility by various means. The first experiment was called "Optimum Length of Fallow". The fallow crop chosen was Gamba grass and the object is to test the effect of fallows of two, three and six years when followed by a three-year rotation of cotton-guineacorn-groundnuts. The layout is complicated because it is planned to permit each length of fallow to be tested by the same crop in the same year in each block. The fallows themselves are further treated in four different ways ; they are either left untouched, cut and left, cut and carried away as fodder or, finally, burnt *in situ*. This experiment is being carried out at Samaru, Bida, Daura and Yola. The second experiment called "Optimum type of Fallow" and is intended to test the value of various different fallows. The fallows are Natural regeneration, Gamba grass, Elephant grass, Pigeon pea, Pueraria species. These fallows will be left for two, three and four years and tested with a three-course rotation. This experiment is being done at Samaru and Yola. The third experiment is to find the optimum use of FYM. in the three-crop

rotation of cotton-guineacorn-groundnuts. The object is to test how 3 tons or 6 tons could be most economically applied to three acres of land containing equal areas of the three crops in the rotation. With each rate of manure, application is made in these three ways :—

- (a) equally divided on all three crops ;
- (b) half to guinea-corn and cotton and none to groundnuts ;
- (c) all applied to guinea-corn and none to cotton and groundnuts.

The experiment is being carried out at Samaru. The last experiment of this group is designed to test repeated applications of FYM. to crops when grown in the standard three-course rotation or when grown continuously on the same land. The rates are 0, 1, 3 and 5 tons per acre which will be applied annually.

AGRONOMIC WORK ON GROUNDNUTS

6. *Spacing*.—Some spacing trials with groundnuts have continued and the results are very interesting. These trials were initiated because, with the introduction of mechanisation, it was possible to consider closer spaced ridges than the standard 3-foot ridge as made by a DY. plough. Six spacings were used but the distance apart on the ridge was worked out so that only two different plant populations per acre were involved. The results are summarised below :—

<i>Spacing</i>	<i>Population</i>	<i>Daura</i> 1948	<i>Daura</i> 1949	<i>Kafinsoli</i> 1948	<i>Kafinsoli</i> 1949
6" × 2'	43,560	1,078	850	1,268	810
4.8" × 2.5'	43,560	983	901	1,234	697
4" × 3'	43,560	947	897	1,188	594
Average		1,003	883	1,230	700
13.5" × 2'	19,360	768	630	1,388	621
10.8" × 2.5'	19,360	770	746	1,278	508
9" × 3.0'	19,360	706	707	1,333	594
Average		748	694	1,333	574

These results show that at Daura and possibly also at Kafinsoli a closer spacing than 9 inches by 3 feet is preferable and that plant population is the main factor although the narrower ridge which gives a better distribution of plants was also better. In 1949 the germination was very poor but as a poor germination is not infrequent at these stations the results are of value even if it only shows that one should sow thickly to attain a normal spacing at harvest time.

7. *Methods of Harvesting*.—At Kano an experiment started in 1948 was designed to investigate the probable losses of nuts from the haulms as a result of—

- (a) delaying harvesting by two and four weeks, and
- (b) leaving the crop in the stook for two and four weeks before picking.

From the results the most interesting fact is that an increase in yield was obtained each year by delaying harvesting after the normal date. The increases for the delay of two weeks were 76, 149 and 185 lb kernels per acre. The experiment is to be repeated in 1950 and will later be considered with similar experiments done elsewhere.

8. *Methods of Sowing*.—At Kano also there are three years results of an experiment to test dibbling groundnuts into the land against the normal native method of sowing. None

of the results was significant and there appeared to be absolutely no difference between the two methods.

AGRONOMIC WORK ON GUINEA-CORN

9. *Establishment after a Grass Fallow*.—At Maigana an interesting experiment which has done two years and is being continued was designed to test whether guinea-corn does better in the first or second year after ploughing up a grass fallow. The normal native practice is to open up new land with cotton which is agriculturally convenient because the land is usually not ready in time for the corn crop but it was desired to test whether, apart from convenience, the corn was unsuitable as a crop in the first year. The land had carried elephant grass and bush for ten years and the treatments consisted of ploughing in 1948 with a guinea-corn crop in 1948 and 1949 against ploughing in 1949 with a guinea-corn crop in that year. The figures for the two guinea-corn crops in 1949 were interesting because there was no significant difference and although the yields were low, the corn on newly broken in land yielded as much as land broken in and cropped the previous year.

10. Incorporated into the above and also repeated at Zonkwa was an experiment to determine the best treatment of the fallow. The treatments were—

(a) grass cut and carried off;

(b) grass cut and burnt *in situ*;

(c) grass cut and burnt *in situ* together with all material from treatment (a).

The averages in lb grain per acre from three experiments at Zonkwa and two at Maigana were 416, 574 and 627 respectively for the three treatments and these figures show the beneficial effect to the following crop of burning in preference to carrying it off as fodder.

Botanical Section, Zaria

COTTON

11. The secondment by the Empire Cotton Growing Corporation of Mr H. E. King, Plant Breeder, to work on cotton in Nigeria has made it possible to form a Cotton Sub-section of the Botanical Section, and an immediate and considerable expansion of the work on this crop has resulted.

12. *Season, Pests and Diseases.*—Rainfall at Zaria was favourable to the crop, but its distribution was atypical in certain respects. The crop developed early after an early cessation of the rains, and a big proportion of the total yield was picked in November. Normally picking starts in December, with January as the peak month.

13. As a consequence of this abnormality of season comparisons between varieties have to be made with some reservations ; for example, the ginning percentage of Samaru 26C was only about 2 per cent better than Commercial Allen, compared with the usual figure of about 5 per cent.

14. Red and spiny bollworms were present from early in the season, but caused relatively little damage ; other insect pests (jassids, aphids, leaf-rollers, etc.) caused minor damage. Bacterial wilt in all its three forms (angular leaf spot, blackarm and boll lesions) was prevalent. In spite of all these, yields were unusually high for Samaru, 600 to 800 lb per acre of seed cotton being obtained in several experiments, with a maximum of over 970 lb per acre for two progenies of 26C origin.

15. *New Introductions.*—Two introductions from Tanganyika, UK.46 and UK.48 were received. The latter (which is the better of the two in Tanganyika) did very well. Twenty-five types from Barberton (South Africa) were also imported. The more important ones were crosses having MU.8 as one parent. MU.8 has previously yielded well at Samaru, but is not up to the required standards in lint quality.

16. *Breeding and Selection Work.*—Breeding plots of 108 selections made in 1948 in 26C and Maiduguri material were grown with good results, and a large number of selfed selections within these progenies were made. Nearly 1,000 new single plant selections were made in Allen, 26C and relatives and the more promising new introductions. All these are undergoing laboratory tests as a preliminary to discarding those with undesirable lint qualities.

17. *Replicated Strain Test A23(49).*—A comprehensive test of seventy-two strains was planted, with the object of comparing in a single trial all the material, local and imported, considered likely to be of use in breeding work or worthy of more extended trial. This trial involved the use of 504 separate plots, and gave much interesting information which cannot be detailed here.

18. *Variety Tests.*—The routine test of multiplication stages of 26C and of its relatives against Commercial Allen was again carried out, one trial being planted at Daudawa and two at Samaru. The combined results of the three trials are given in the following table :—

					Seed Cotton lb. per acre	Lint lb. per acre	Lint as per cent of Allen	Ginning per cent
26C Selfed seed	..	..	..	..	565	188	109	33.3
Stage 0 seed	..	..	..	..	547	182	106	33.3
Stage 1 seed	..	..	..	..	559	186	108	33.3
Stage 2 seed	..	..	..	..	595	199	115	33.4
Stage 3 seed	..	..	..	..	522	173	100	33.1
Mean of 26C Stocks	..	..	..	..	558	186	107	33.3
Commercial Allen (ex Wase)	..	..	..	..	552	173	100	31.3
26C Relatives 26H	..	..	..	..	569	191	110	33.6
26E	..	..	..	..	565	190	110	33.6
26I	..	..	..	..	621	212	123	34.1

19. There is a suggestion from those figures that stage 3 is inferior to the other 26C stocks, and this has brought down the overall average in comparison with Allen. At the same time it seems clear that 26C has not this season shown its full superiority over Allen, particularly in the matter of ginning percentage.

20. *Seed Production*.—In spite of heavy roguing (involving the removal of about 7 per cent of the plants) the heavy yields on the $\frac{1}{2}$ -acre selfing plot of 26C made 170 lb available for 1960 stage 0 planting at Daudawa. In co-operation with the Senior Agricultural Officer, Daudawa, a scheme has been worked out to speed up the multiplication of 26C. It is estimated that the new scheme will enable improved material bred at Samaru to reach the whole of the cotton areas in seven years as compared with the nine or ten years required at present.

21. *Laboratory Work*.—Much time has been spent in training staff in various laboratory techniques and in devising equipment and apparatus. Preliminary examination of lint characters is now undertaken at Samaru and the produce of some 1,400 single plant selections will have been individually examined before the 1950 planting season starts. This makes the maintenance of lint quality in selections a much less hit-or-miss matter than before, when lint tests were confined to the necessarily small number of samples which the Shirley Institute could deal with.

22. The process of seed delinting by means of sulphuric acid has been introduced, and all seed for 1950 planting has been acid treated.

23. *Spinning Test Results*.—Shirley Institute reports on the 1948-49 season's samples show that in the Daudawa variety test W3(48) all samples were of unusually poor quality, with 26E and F the worst. 26I and 26C were both somewhat superior to Allen in maturity and yarn appearance, and a little inferior in lea strength. This latter finding, while usual in 26C, is disappointing in the case of 26I which has previously done better.

24. Samples from the Samaru trials A10(48) and A11(48) (reported last year) showed that none of the imported strains is the equal of 26C in yarn strength, while the yarn from late plantings was consistently weakly and of poorer appearance than that from the same strains planted early. This is a point of interest in view of the efforts at present being made to encourage earlier planting purely from a productivity point of view.

GROUNDNUTS

25. *Selection Work*.—Replicated progeny rows were grown of the 405 single plant selections made from newly collected local types of groundnuts in 1948. On the results of these, all but the eighty most promising were discarded. These eighty will be given further tests in 1950.

26. *Variety Yield Trial No. A4(49)*.—This trial continued the annual series reported last year. Results were again contradictory, but the outstanding point was the good performance of Natal Common, a newly introduced South African variety which was included for the first time. This came out top of the trial with 1,380 lb per acre of kernels. Of the older varieties, MJ.374 and MK.383 are perhaps the most consistent. Samaru 38 had another bad year, coming out twelfth out of fifteen.

27. *Strains and Mixtures Trial No. A5(49)*.—In view of the variable performance from year to year of the individual strains, it was thought possible that, over a period of years, a mixture of related strains might prove more reliable than any single strain. To test this possibility, an experiment was laid down which will be repeated for several years. The experiment contains four of the best strains grown alone, and mixtures of the same four in

varying combinations and proportions. Differences were not significant, but it was noteworthy that the four mixtures containing Samaru 38, and Samaru 38 itself occupy the first five places, and mixtures containing Castle Cary occupy places four to seven. The bottom two places were occupied by two pure strains, MJ.374 and ML.3710.

28. *New Introductions*.—Small quantities of seed of eight American varieties were received and planted in multiplication plots. Six of them gave most promising yields.

GUINEA-CORN

29. *Selection Work*.—Work was started on testing possible improved methods of mass selection with unselected mixtures. The methods consist of carrying out varying degrees of progeny testing before selected heads are accepted for inclusion in the selected mass. The results of these selection methods will come up for test in 1952. The 1949 programme was concentrated on the local Farafara variety, and a follow-up experiment with the local Light Mori variety will be initiated in 1950 with a view to confirming in 1953 the results of the 1952 test.

30. Attempts to breed a short variety of Farafara guinea-corn by hybridisation between normal Farafara and the short Kaura variety have resulted in the production of a single plant of the required type, which will form the basis of further breeding work.

31. Work continues on the improvement, by selection, of the short Kaura variety.

32. *New Introductions*.—Fifteen Sorghum varieties from the United States were received and planted in multiplication plots. They consisted of seven grain types developed for combine harvesting, and eight types intended for sugar and syrup extraction. Germination was very poor and subsequent performance unpromising, but the varieties will in any case form a valuable source of breeding material for the development of dwarf types locally.

33. *Local Varieties*.—An attempt is being made to get a complete collection of Northern Provinces guinea-corns, and 103 have so far been received, with more still to come. Many of these will no doubt prove eventually to be more or less identical, but it is hoped to isolate from them a comprehensive collection of existing types as a preliminary to further breeding work.

MAIZE

34. Good yields were obtained from some imported varieties from the United States of America, and hybrids between these were made. When the order was placed inbred strains were asked for but it is fairly certain that what was sent was actually hybrid seed. However, work in 1950 will show whether these maizes are likely to come to anything in Northern Nigeria.

SOYA BEANS

35. The newly introduced variety, Avoyelles, has again come out best in a yield trial (No. A7(49)), and this year yielded 1,102 lb per acre of dry beans. If this result is repeated in the 1950 trial, this variety will take the place of Benares and Malayan as the best variety for Zaria area. Avoyelles is being distributed to outstations for general trial.

36. Eleven new introductions from the Philippines, India and Ceylon were also given preliminary trial, and four of them gave promising results.

BENNISEED

37. A programme of selection of benniseed (*Sesamum indicum*) was started at Yandev, Benue Province. Two main objectives in view at present are :—

- (a) selection of an earlier maturing variety which would be suitable for planting in seasons when rains are late, and would also extend the limited area at present suitable for early benniseed, and

(b) selection for higher yield at ordinary maturity.

38. 200 single plants were selected which matured from nine to sixteen days earlier than the main harvest, and this gives promise that a variety at least two weeks earlier should be possible. Under the second head, some 400 high-yielding plants were selected, and brought to Samaru for examination. 160 of these were retained. Retained selections under both heads have been planted out in replicated progeny rows at Yandev, making a total of some 1,350 plots to be individually recorded in 1950.

Botanical Section, Ibadan

39. With the appointment of a Plant Pathologist, to work chiefly on *Phytophthora* pod-rot of cocoa, it was possible to renew the Pathological work of the section after a long lapse. The Botanist at Ibadan continued to be responsible for the other botanical work in the Western and Eastern Provinces and the scope of the work was of necessity restricted to what one person could supervise. Under these circumstances work on annual crops tends to suffer since the experimental plantings of permanent crops already started cannot be dropped readily. Credit is due to the junior staff of the section who did their allotted tasks with minimum of supervision.

40. At Ibadan, abundant rains in the wet season were followed by an extreme dry season in which less than $1\frac{1}{4}$ inches of rain was recorded over a period of four and half months. This severe drought had a most damaging effect on new plantings of cocoa and other tree-crops.

COCOA

41. *Varieties*.—Work on cocoa varieties included the propagation of the Nigerian selection T38 and acquisition and trial of introduced varieties. In the case of the Nigerian selection the policy is to plant large blocks of clonal material from which the farmer will be able to obtain seed. The original intention was to adopt budding as the chief method of vegetative propagation and to use rooted cuttings on a small scale only, but the budding of cocoa in the field has proved less successful than was expected and with improvement in the rooting of cuttings this method is being developed as being quicker and more dependable.

42. In place of the former practice of rooting cuttings in closed shaded frames, the method devised in Costa Rica has been adopted in which the cuttings are placed in sand in a bed open to the full sun and are kept continually moist by a spray of water. Rooting by this system has been both rapid and dependable and, though heavy loss in hardening off the young plants has occurred, this difficulty can doubtless be overcome with experience.

43. The Trinidad introductions brought in between 1933 and 1940 which include clonal material of the Imperial College selection Nos. 1 and 7, and seedling progeny of ICS. 1, 4, 7 and 9, have attracted attention by the promising yield of some trees. In the trial at Ina Cocoa Farm in which the progeny of the Nigerian selection T38 is compared with progeny of some of these Trinidad trees and with progeny of crosses between the Nigerian and the Trinidad, the cross-bred has continued to give higher yields than either parent. The trees, planted in 1942, bore their first pods in 1946, and the following figures summarise the total yields of wet cocoa obtained from each type in the first four years of bearing.

YIELDS OF PROGENY TRIAL : INA FARM, 1946-49

					<i>Weight of wet cocoa per acre</i>
Progeny of Nigerian-Trinidad crosses	..	..	..	..	1,014 lb
Progeny of Trinidad selections	..	..	..	..	330 lb
Progeny of Nigerian selection	..	..	..	..	153 lb

44. The Nigerian-Trinidad hybrids in this trial have shown increased vigour from the start. Measurement of girth of stem in 1945 showed that they were significantly greater than the progeny of the parental lines, and this more vigorous growth has been accompanied by earlier fruit-production.

45. *New Introductions*.—The latest collection of introductions is still being received from the West African Cocoa Research Institute. It includes the progeny of trees selected in the

Amazon basin and Central America by the late F. J. Pound, later brought to the Gold Coast by A. F. Posnette. Some of these Amazon seedlings have shown remarkable vegetative vigour and young trees at Ina when twelve months old from seed had reached a height of 6 feet. It was thought that this early vigour might be of special value in the main Nigerian cocoa area where severity of the dry season makes establishment of a cocoa farm difficult and watering cannot readily be done. The Amazon seedlings were accordingly given the best condition of soil, mulch, and shade but were subjected to the full rigours of the dry season without watering. Against this treatment they proved no more tolerant than the local cocoa, nine plants out of ten died back from the tip and about half succumbed.

46. *Establishment of Cocoa*.—The die-back in the first dry season is the chief obstacle to successful planting of cocoa in the Ibadan area. The following figures show losses sustained in planting a small area at Agodi in 1948 and supplying misses in 1949. At each stand three seeds were sown and if one survived the stand was regarded as successfully established.

ESTABLISHMENT OF COCOA FROM SEED, PLOT SS : AGODI FARM

			<i>Stands sown</i>	<i>Died 1st dry season</i>	<i>Died 2nd dry season</i>	<i>Surviving 1950</i>
1948 planting	..	..	442	304	48	90
1949 planting	..	..	304	111	—	193
			746	415	48	283

It will be seen from these figures that, of 746 stands sown in the two years, 415 were lost in the first dry season. After two years' efforts to plant at stake, only 283 of the 442 stands have been successfully filled. This loss is believed to be typical of that experienced by the farmer in this area when establishing a cocoa farm.

47. The die-back is caused by attack of the small Scolytid beetle (*Coccotrypes pygmaeus*) which bores the stems of the young plants. No damage of the kind is seen in nurseries where seedlings are watered regularly and when young plants in the field have been watered in their first dry season no appreciable loss has occurred. It is evident that the farmer must find and apply water to his new cocoa farm (in some places by no means an easy task) or else he must expect to suffer heavy loss and to spend two or three years in establishing his farm successfully. Where valuable new material is being distributed, watering in the first dry season must be regarded as essential.

48. *Planting Distance*.—The spacing trial planted at Ina in 1942 has now reached an interesting stage in its growth. The two densest plots with young trees 5 feet apart and 6 feet apart have now made a closed canopy and have produced a woodland effect with no undergrowth but a carpet of dead leaves. The wide-spaced plots with trees at 10, 12 and 15 feet have no continuous canopy and are invaded by undergrowth of grass and herbs. Maintenance of shade in these plots has proved difficult. On the other hand the trees at wide spacing have preserved their characteristic branching and storied effect whereas at close spacing the trees have a straight unbranched stem until the canopy is reached. At this early stage the outstanding advantages in growth and yield are with close spacing, though this year, for the first time the highest yield per plot was given not by the closest spacing of 5 by 5 feet but by the second closest planted at 6 by 6 feet, (1,210 trees to the acre).

49. *Agodi Farm*.—An analysis has been made of yields from the Agodi Farm, 10 acres of cocoa planted by farmers from sixteen to thirty years ago and maintained since 1941 by the Department. Yields of pods from individual trees have been recorded since 1942 and six

years' figures have given results of interest. The greatest yield has been given by the oldest plots from twenty-five to thirty years of age, most of which show a spacing of 400 to 500 trees per acre. In a group of plots between fifteen and twenty years old the best yields per acre were given where the trees were rather dense, from 800 to 1,000 to the acre. In young plots planting is as close as 1,348 trees to the acre.

50. The mean annual yield of dried cocoa over the six years of records has been 563 lb per acre (which is considerably above the average for Nigerian cocoa) and the mean yield per tree 0.83 lb. No clear correlation between yield and rainfall could be traced but there was a marked tendency towards alternation of high and low yields in succeeding years. These results are discussed more fully in a paper which is being prepared for publication.

OTHER CROPS

51. *Kola (Cola nitida)*.—With the acquisition of the new farm at Agege which contains established kola, it has become possible to begin recording the yields of kola trees of different ages and planted at different spacings. During the year several plots were defined and trees were numbered with a view to obtaining individual tree yields over a period of years. Records of the inheritance of nut colour were continued on the existing experimental plots at Moor Plantation. Regular observations were made on the occurrence of the staminate and the pistillate flowers on several selected trees, in the hope of finding some explanation for the great variations in yield occurring amongst kola trees.

52. *Coffee*.—Observations were continued on the varietal collection at Moor Plantation to which Niaouli variety from Dahomey was kindly contributed by the French Agricultural Service. Tests were made to discover the best conditions for rooting cuttings of robusta coffee, by use of which it is proposed to make a collection plot of high-yielding selected trees which will serve as a source of seed of good parentage.

53. *Citrus*.—High yields of fruit continued to be harvested from the citrus root-stock trials at Moor Plantation. Thus six trees of grape-fruit budded on sour orange stock produced 11,532 fruits in 1949 their fifteenth year of fruiting. Since 1935 these six trees have yielded a total of 97,506 fruits although given no manure or fertiliser of any kind. This good performance on the part of the trees is largely spoilt by depredation of pests. For some weeks at the height of the season no fruit escaped damage from the many species of fruit-moth or the Coreid-bug (*Leptoglossus membranaceus*). Some means of reducing the enormous wastage caused by these pests would need to be found in any effort to grow oranges and grape-fruit commercially.

54. *Cotton*.—The improved Ishan selection of cotton was maintained and propagated. On Moor Plantation there was a complete absence of *Helopeltis sanguineus*, a welcome and unexpected change from the past several seasons in which this pest has ruined the crop.

55. *Tobacco*.—Four imported varieties of tobacco were grown under observation at the request of the British American Tobacco Company. A high yield of good leaves was obtained from the varieties Virginia Hybrid and Heavy Western, something less from Harrison Special and Bonanza. But although every care was taken in air-curing, the final product was dark and inclined to mould, further evidence that under the best of conditions air-curing cannot be done successfully in the forest country of Nigeria.

56. *Cassava*.—Work on cassava was done in the Eastern Provinces at Umuahia with some parallel experiments at Ibadan. In yield trials at both places the Gold Coast hybrid GC997B yielded significantly better than the varieties being grown by the local farmers. For most purposes it gave a product of good quality and can suitably be recommended as the standard variety. Although regarded as showing some resistance to mosaic this variety is now largely infected by virus. Both at Ibadan and Umuahia attempts have been made to see if a virus-

free stock of planting-material can be grown by planting in an isolated plot and removing any plants showing infection as soon as the symptoms appeared. At Umuahia this was done with some success both for GC997B and a local susceptible variety, but experience at Ibadan made it clear that any infected cassava in the vicinity or any inefficiency in roguing will soon lead to complete failure. A trial at Umuahia in which cassava sticks were planted horizontally, vertically, and obliquely, showed no difference in yield between the three methods. The planting of three sticks per stand gave a greater yield per stand than two sticks and one stick, suggesting that the spacing adopted with stands 3 feet apart on 4-foot ridges is unnecessarily wide.

57. *Miscellaneous Crops*.—Tests both at Umuahia and Ibadan on a collection of cow-pea varieties from East Africa have confirmed their superiority in yield to types grown locally, and trials on a wider scale now seem desirable. A new introduction, *Stylosanthes gracilis*, used in other countries as a leguminous fodder and cover-crop, has given promising results and shown a good measure of resistance to drought. A collection of the varieties of yam cultivated in the country, which fall into several of the species of *Dioscorea*, is being gathered together to form the basis of work on the improvement of this crop when adequate staff becomes available.

58. *Other Work*.—The introduction of desirable varieties of plants for the Department, and the dispatch of plant-material for other countries, continued to be done through the Botany Section. The largest importation was seed of a varied collection of vegetables and fruits kindly sent by the Department of Agriculture, Ceylon. The introduction of useful plants and recording of their performance in this country call for more attention than can be given in the present shortage of qualified staff.

Of the many inquiries on botanical matters which were dealt with, a number concerned species of *Strophanthus*, following the premature publicity given to *S. sarmentosus* as a source of cortisone. This species is conspicuous in the south at the time of flowering but fruits much less commonly in the forest area than in the savanna country to the north. Other species seen in the south include *S. hispidus*, *S. barteri*, and *S. preussii*, but in no case is the fruit plentiful.

Chemistry Section, Northern Provinces

STAFF

60. During the year no Senior Service staff was available and for several months there was in fact no Agricultural Chemist in Nigeria. The Chemical work at Samaru was supervised by the Principal Agricultural Officer from January to June and by the Assistant Director (Experiments) from then onwards. On the return from leave of the Agricultural Chemist at Ibadan in January 1950 arrangements were made for the transfer of all analytical work to the Ibadan Laboratories while the chemical staff at Samaru maintained the field programme. This temporary arrangement of centralising the work at Ibadan is not satisfactory and it is hoped that staff will become available to reopen the Chemistry Section of the Northern Provinces at an early date.

FIELD EXPERIMENTS

61. (a) *Residual Effects from Superphosphate*.—Some notable residual effects were recorded during the year. At Kano, 50, 100 and 200 lb of superphosphate were applied to guinea-corn in 1947 and the residual effects tested with groundnuts in 1948 and 1949 and in each year highly significant increases were obtained. The increases per acre in crop yields from the low dressing of 50 lb per acre are the most interesting and were 262 lb of guinea-corn in 1947, 313 lb kernels in 1948 and 153 lb in 1949. Significant residual effects were also obtained when groundnuts were grown after guinea-corn manured in 1948 and when guinea-corn was grown after manured groundnuts; the increases due to the residual effect of 50 lb superphosphate was 20 per cent for groundnuts and 14 per cent for guinea-corn. At Damaturu which was a possible site for a groundnut scheme the groundnuts grown after manured millet in 1948 failed because of lack of rain but when millet was grown after manured groundnuts an increase of 8 per cent was obtained because of the dressing of 50 lb per acre of superphosphate the previous year. In all these experiments greater increases were usually obtained as the residual effects of higher applications of superphosphate the previous year but usually as more superphosphate was added the return per unit of 50 lb was reduced.

(b) *Residual Effects from Gypsum*.—In 1948 Gypsum dusted at the rate of 100 lb per acre was applied as a half-plot treatment to groundnuts receiving various combinations of nitrogen and phosphatic manures. Gypsum had a most marked effect on foliage production, the overall effect being : Haulms = +249 lb (-22 per cent) : Kernels = -106 lb per acre (=16 per cent). A marked residual effect was apparent in the foliage of a second crop of groundnuts grown during the present year. Plants on the half-plots which had received gypsum were noticeably greener and bigger. The overall effect due to gypsum was : Haulms = +328 lb (i.e., +19 per cent) (Significant Difference at 1 per cent = 161 lb) : Kernels = +69 lb (i.e., +15 per cent) (Significant Difference at 5 per cent = 53 lb per acre).

(c) *Effect of Phosphate and Nitrogen on Early and Late Planted Groundnuts*.—In 1948 it had been found at Damaturu that sulphate of ammonia caused a marked decrease in the percentage of kernels in nuts which was in part counteracted by superphosphate and as it seemed likely that this effect was exaggerated by the unusually short growing season it was decided to investigate it at Samaru by applying 100 lb per acre sulphate of ammonia and 100 lb superphosphate separately and together to groundnuts sown at normal sowing date and also two and four weeks later. The results showed no difference in shelling percentages although in the plots sown at the normal date the ammonium sulphate did produce a significant retardation in flowering.

(d) *Relative Effects of Lime and Gypsum.*—Applications of 100 lb gypsum per acre and of freshly slaked lime containing an equivalent weight of calcium—43 lb per acre—were made to roots and foliage of groundnuts receiving (i) no manure (ii) and (iii) pellets of triple and single super equivalent to 11 lb P_2O_5 per acre. The foliage of plants treated with triple super alone and in combination with lime, was yellow : it was noticeably greener in plants receiving single superphosphate or triple super plus gypsum. It was seen that lime had a slightly depressant effect on both kernel and haulm yield whilst gypsum caused a marked increase in haulm weights in plants treated with triple super.

(e) *Groundnut Placement Trials : Pelleted Superphosphate.*—A résumé of work with pelleted fertilisers was given in a paper read to the International West African Conference at Ibadan in December 1949. The cost of pelleting fertilisers commercially has proved higher than was anticipated, and an alternative to stamped pellets is being sought in granules roughly one-third the weight of the pellets originally used ; three granules will be used per stand. Pot experiments have shown that on reducing superphosphate pills to this weight direct contact with the seed causes no appreciable germination lag or retardation of early growth. 1,000 tons of these superphosphate granules with a mean weight of about 0.5 gm have been ordered for distribution in the coming year and random placement with the seed is recommended.

GINGER

62. The excellence of the samples obtained from the Kachia market in 1948 and 1949 suggested that pre-market sampling could now be dispensed with. Accordingly no field laboratory was set up for the market held at Kachia between 13th and 17th February, 1950. Samples were taken in the market and sent to Samaru for analysis. Purchases were small, amounting to only 26 tons. Certificates were granted in respect of 24 tons of Grade I and 2 tons of Grade II. All samples conformed to BP. Standards.

EASTERN PROVINCES

63. *Outstations.*—There were no large-scale outstation experiments laid down in the 1949 season but the residual effects from 1948 experiments on cassava were studied in a number of places.

With one exception, the residual effects of the experiments so far recorded, gave no significant results. At Owerrri, however, a significant effect for Nitrogen ($N_2 > N_1 > N_0$ all at 1 per cent level) was obtained. Investigation showed that cassava in this case was planted much earlier than the other experiments. This aspect will be further studied in the 1950-51 season.

64. *Umudike Experimental Farm.*—A twenty-seven factorial levels experiment on yams was laid down on blocks S20-34A. Only Potash applied at $\frac{3}{4}$ cwt per acre gave a significant result which was at the 1 per cent level.

65. *Nkwelle Experimental Farm.*—An experiment with eight replications of NPK. and their combinations, subdivided as to application, was laid down on yams in blocks D 77b-98. The rates of application were Sulphate of Ammonia 2 cwt, Superphosphate 3 cwt and Muriate of Potash 1 cwt per acre. Half of each plot had fertiliser broadcast while other half had fertiliser applied around each plant.

66. The most outstanding result in this experiment was that the direct placement of fertiliser around the plant was significantly better at the 1 per cent level than broadcasting.

67. The application effect is of major interest as it confirms our present practice in the Eastern Provinces of applying all fertilisers in one application to yams after germination.

68. The complete fertiliser of NPK. gave the best overall results and was significantly superior to most treatments at the 1 per cent level. P and K applied alone or in combination with one another had no significant effect over NIL fertiliser ; all other combinations of NP. and K had some significant effect.

WESTERN PROVINCES

69. *Food Crops*.—The fertiliser trials on food crops in this Region were at Moor Plantation and Oil Palm Research Station, Benin.

OIL PALM RESEARCH STATION, BENIN

70. *Arable Fertiliser Experiment*.—There are two rotational experiments with fertiliser treatments on the yam and maize courses. In 1949, both experiments had yam courses with a twenty-seven factorial levels experiment superimposed at the following rates :—

Sulphate of Ammonia	nil—1½ cwt—3 cwt acre
Superphosphate	nil—1½ cwt—3 cwt acre
Muriate of Potash	nil—¾ cwt—1½ cwt acre

The only significant increase in yield in both experiments was due to Nitrogen. In one experiment both N₂ and N₁ were significantly greater at 1 per cent over nil with no significant difference between each other. In the other N₂ is significantly better than nil at 5 per cent while N₁ just misses being significantly greater than nil.

71. *Moor Plantation*.—The four course rotations RPQ. and S have not completed their cycle. There are fertiliser experiments superimposed on all replications of R and P.

In rotation P two courses had fertiliser treatment, one on early maize the other on yams. The rates of application for both crops are as follows :—

	cwt/acre
N as Sulphate of Ammonia	3
P as Superphosphate	2
K as Muriate of Potash	1

72. In the first course of rotation P, which was early maize all fertiliser treatments showed positive response. However, the combinations which included N were significantly better at the 1 per cent level.

73. In course three of rotation P, which was yams, complete fertiliser (NPK.) is significantly better than all treatments except N, where it still shows positive results. The yam crop on both the former courses was below average due to the lack of early rains.

74. In rotation R, an experiment using farm-yard manure and artificial fertilisers was laid down. The treatments were :

- (a) Control NIL manures.
- (b) 8 tons farm-yard manure per acre.
- (c) Artificial fertilisers equivalent to 8 tons farm-yard manure per acre.
- (d) 4 tons farm-yard manure per acre plus the fertiliser equivalent of 4 tons of farm-yard manure.

The crop, which was early maize, gave a significantly larger yield in favour of fertilisers alone. The combination of 4 tons farm-yard manure plus its equivalent in fertilisers, was significantly better than the heavy dressing of farm-yard manure, and the control, at the 5 per cent and 1 per cent levels respectively.

75. The residual effects of this experiment on future crops will be closely followed, to study the effects of farm-yard manure application.

76. *Tobacco*.—A twenty-seven-factorial experiment using three levels each of NPK. and their combinations was laid out for the B.A.T. at Ago Arc. The effects of the treatments were very marked on yield and curing over the native practice. A manurial deficiency probably magnesium was apparent in one experiment ; due likely to the increased growth and vigour of the plants. The experiment will be relaid in 1950 with levels suitable for statistical analysis.

77. *Teak Seedlings*.—In co-operation with the Forestry Department a NPK. levels experiment in the teak nursery at Abeokuta was laid down. The results of these experiments will not be available till mid 1950 when the seedlings are transplanted from the nursery.

78. *Soil Surveys*.—In January to February 1949 a soil survey of a detailed nature was made at Mokwa (Niger Province) for the Niger Agricultural project of the CDC. A full report including the laboratory analysis has been submitted which indicated that the area concerned would be suitable for the large-scale production of groundnuts.

79. In May a reconnaissance survey of the Shendam Resettlement Area was completed. Suitable sites for the new settlement have been indicated to the authorities concerned. A full report has not yet been compiled.

80. Two surveys were made and reported on for the proposed market garden in the Lagos Area. The first survey was made in March 1949 on Meridian Point and Centre Island ; the second in February 1950 on land forming part of the Ikeja Airport. The first area was condemned, whilst the second site was considered suitable for the establishment of a market garden.

81. *Fodder and Pastures*.—Samples from the frequency of cutting experiment combined with different ratios of farm-yard manure on Elephant grass are being analysed. Due to shortage of staff and pressure of other work, some 150 samples are awaiting analysis.

82. *Oil Seeds*.—The laboratory took on a commercial aspect with processing of tetracarpidium conophorum for the Board of Trade. A total of 2,860 lb of processed kernels were shipped to the United Kingdom, a four-fold increase over 1948. The kernels averaged approximately 48 per cent oil and the FFA. did not exceed 0.5 per cent in any one consignment. A composite sample after three months storage in Liverpool gave an FFA. content of 0.6 per cent. This consignment of 2,860 was solvent extracted in the United Kingdom but unfortunately due to overheating only 9 cwt of oil with an FFA. of 1.6 per cent was obtained, and the iodine value was slightly lower than previous years. Conophor oil has been favourably reported on by the Paint Research Bureau after extensive tests in comparison to linseed oil.

MISCELLANEOUS

83. The analysis of soil and fodder samples made up the main routine of the laboratory staff. A number of special analyses were made from time to time on farm-yard manure, compost, feeding stuffs, etc., for Agricultural Officers.

Entomological Section

STAFF AND GENERAL

84. Mr A. Pickles, Senior Entomologist left Nigeria on the 15th April, 1950 on promotion to the post of Deputy Director, West African Cocoa Research Institute, Gold Coast. Mr J. L. Gregory was appointed Entomologist on the 23rd February, 1950. The Entomologist of the Empire Cotton Growing Corporation, Mr Q. A. Geering, has been on vacation leave since 15th of January, 1950. Mr H. B. Johnston (Anti-locust Liaison Officer) accompanied Mr Davey, Entomologist, on a tour of Northern Bornu from December 1949 until February 1950. Visitors to the section included Professor R. M. Gordon and Dr O'Rourke from the Liverpool School of Tropical Medicine and Dr Nash, Chief Entomologist, West African Institute of Trypanosomiasis Research.

LOCUST PROBLEMS

85. *Migratory Locust (Locusta migratoria migratorides)*.—A small but permanent population of the Migratory Locust has persisted for many years in Northern Bornu. Within this area, habitats in which locusts are usually found are of two distinct types, i.e., the marshes along the Nigerian shores of Lake Chad, and the inland fadamas or swamps.

86. Since January 1949, two visits have been made to Northern Bornu. The first of these visits was mentioned briefly in the annual report of the Department for 1948 when only fifteen specimens were observed throughout the investigation.

87. The same area was visited by Mr H. B. Johnston in June and July. By that time locusts were numerous in the fadamas and in July, egg-laying was observed. It was impossible to decide whether the increase was due to a spring generation or a migration into the fadamas at the end of the dry season. Mr Johnston concluded that from what little was known of the circumstances migration appeared to be more likely.

88. It was then decided that a joint visit should be made by Messrs Davey and Johnston as soon as possible after the cessation of the rains both as a prelude to a study of the movements of the solitary population and to observe the ecological conditions in the fadamas at the beginning of the dry season ; in this latter object they were defeated by the exceptionally low rainfall of last year. Several fadamas, depending for their water on the flooding of the River Yedseram, were unfilled throughout the rains, many others were rapidly drying out. In fact in November, conditions differed little from those obtaining in February or March in a more normal year. The level of Lake Chad (which does not depend on local rainfall) was unaffected and flooding from this source was as extensive as usual.

89. The outstanding features of this latest investigation were the great increase in the locust population and its widespread distribution. The number of locusts seen was greater than on any previous survey. Evidence suggested that two generations had been produced since March, one at the beginning and one at the end of the rains.

90. Locusts in January were more widely distributed than at any time during the last four years. The area affected lying to the east of a line joining Kumshe (11°36'N., 13°22'E.) and Baga (13°N., 13°22'E.) covers approximately 1,300 square miles. Within this area thirty localities were sampled. With one exception locusts were present in all and it is almost certain that they were equally common in many other districts which it was not possible to visit.

91. In phase, the population is not far removed from *solitaria*. Comparison of E/F ratios of the present population with those collected in 1947 shows a slight increase in *transiens* forms this year. No report of swarms of hopper bands were received throughout the year.

92. *The Red Locust (Nomadacris septemfasciata)*.—The past four years have shown a gradual decline in the status of this locust and no specimens were taken during the recent survey. It now seems probable that the population found in Bornu in other years was the last remnant of invading swarms.

93. *The Desert Locust (schistocerca gregaria)*.—No reports of this locust were received during the year. It is not a permanent resident in Nigeria.

TSETSE FLY INVESTIGATIONS

94. During the year it was decided that the section should begin investigations of the species and importance of the tsetse flies in the Southern Provinces. After a visit to the field station of the West African Institute of Trypanosomiasis Research at Katabu it was decided that the area around Olokemeji would provide a suitable centre for long-term research and a preliminary survey was made.

95. As was expected, tsetse were numerous along the Ogun River where it runs through the Olokemeji Forestry Reserve. *Glossina palpalis* and *G. longipalpis* were equally common ; a single specimen of *G. fusca* was also taken. A further survey was made in October when a fourth much rarer species *G. medicorum* was taken. The retiring habits of this species allow it to be easily overlooked. It was not attracted to humans, screens, or a bait animal (pig), but was found after careful searching resting vertically on young saplings under heavy shade. There is no doubt that this area can provide abundant material for comparative studies of the four species.

96. During the dry season fly counts were made on Government farms at Fashola, Moor Plantation and Agege. At Fashola and Moor Plantation tsetse (*G. palpalis*) were common as late as February when one would expect the fly population to be at its lowest. At Fashola where the resistance of N'dama cattle is being tested this is a decided advantage. The Agege Experimental Farm and Dairy were free of tsetse at the end of February.

97. On some farms, where cases of trypanosomiasis are by no means uncommon, the infection rate of tsetse caught and dissected is inexplicably low. This has led to a consideration of the possible importance of mechanical transmission ; a research programme on this aspect has been arranged.

CHRYSOPS INVESTIGATIONS

98. It was not possible to post a junior officer to the Oil Palm Research Station throughout the *Chrysops* season, but certain investigations were made.

99. Work on this problem is handicapped by inability to make determinations of the species in the larval stage for it is often difficult to separate the different *genera* involved. Large collections of larvae were made and brought to the Ibadan laboratories for systematic studies and rearing to maturity. At the moment there seems little hope of devising a key to the larval stages of the various species.

100. Preliminary experiments were designed to elucidate the factors which affect the distribution of *Chrysops* larvae in the mud along the banks of the River Okhuo near Benin. Samples were selected according to their different water content varying from mud under one foot of surface water to dry land. Larvae were extracted by sieving ; the pH values of the samples were determined. From 100 samples, ninety-four dipterous larvae were taken.

Tabanidae formed 50 per cent of the total catch and of these 62 per cent were adjudged to be *Chrysops*.

101. No larvae were taken from samples of mud under one foot of surface water nor from dry land. Eighty-five per cent of the larvae were taken in saturated and damp soil and the remainder were from samples having less than one inch of surface water. The number of larvae taken was too small to allow definite conclusions to be made but the indications are that *Chrysops* larvae are unable to tolerate an excessive depth of free surface water. The pH value of the habitat did not appear to have any effect on the distribution of the larvae.

COCOA PROBLEMS

102. These investigations have been carried out by the Senior Entomologist and the notes which follow are abstracted from his observations. The planting and rehabilitation of cocoa in the Western Provinces has in the past been complicated by the high mortality of young seedlings. A small beetle *Coccotrypes pygmaeus* can usually be found in the stems of dead and dying seedlings. Field observations suggested that only seedlings growing under adverse conditions (lack of water and shade) were killed by the pest. To obtain an indication of the true importance of this beetle cocoa seedlings were artificially infected. Adult beetles (4-6) were confined in celluloid cylinders on the stems of the seedlings. The plants were watered daily and kept under heavy shade. Only one infected seedling was killed. As a result of this indication that well-tended seedlings are not subject to heavy losses through the attack of this beetle, large-scale trials have been started to compare the effect of the beetle attack under good and adverse conditions. The results of these experiments will not become available until much material has already been planted ; in the meantime it is recommended that stems of seedlings be painted with a standard DDT. preparation.

103. Some deaths of young cocoa plants in the field have arisen from infestation of the base of the stem below ground level by a Lamiline beetle hitherto unrecorded ; only a small number of the total deaths in young cocoa appear to be due to this insect. Where serious outbreak arise plants still unattacked may be protected against the beetle by sprinkling argocide 2 on the surface of the soil and working it into the top soil around the roots and stem base.

104. The section is undertaking a survey of the indigenous parasites of cocoa mealy bugs as a preliminary to assessing the possibility of successful introductions of foreign parasites. Sixty parasites have already been collected. The following *genera* are represented : *Cheilonurus*, *Leptomastix* and *Anagyrus*.

CITRUS INVESTIGATIONS

105. Sporadic outbreaks of the coreid bug *Leptoglossus membranaceus* are well known on Moor Plantation. A very severe attack in May, repeated in August, caused crops losses as high as 60 per cent.

106. The pest did not breed on citrus and all attempts to rear the insect on this host have failed. They left the ripe fruit in May, and eggs were laid on various alternate host plants of which *egusi* (*Citrullus vulgaris*) is the most important. On this plant two generations were produced and a greatly increased population returned to attack the citrus in August. This attack lasted until October.

107. Although an eradication campaign against the alternate host would reduce these attacks successfully the sporadic nature of the outbreaks and the fact that *egusi* is an important article of native diet suggests that other measures would be preferable. Various sprays were tried both on citrus and *egusi*. On citrus 1 per cent DDT. in kerosene gave a good kill but a power spraying machine was essential. As cucurbitaceous plants are highly susceptible to chlorinated compounds the latest insecticides could not be used on the *egusi*. An extract of

nicotine from local tobacco refuse was tried unsuccessfully. Damage due to fruit piercing moths during the year was slight and no control was attempted.

--COTTON PROBLEMS

108. On Moor Plantation insecticidal trials on a field scale were planned against the attacks of the capsid bug *Helopeltis sanguineis*. Past experiments had shown that insecticidal control was possible ; and this season's trials were designed to determine the most suitable insecticide, the minimum concentration necessary and the comparative effectiveness of dusts and sprays. However, as the season progressed it became obvious that the usually severe attack of this pest was not materialising and throughout the season the plants were healthy and very few insects were seen. When flowering commenced, the plots were subdivided and the original spraying programme modified to see if bollworm attack could be lessened ; neither DDT, nor gammexane appeared to have any effect.

109. Entomological problems of cotton in the Northern Provinces have continued to be studied by Mr Q. A. Geering, Entomologist of the Empire Cotton Growing Corporation. The following observations are extracted from his interim report.

110. A study of the complete annual cycle of red bollworm activity has now been made. The peak activity of red bollworm occurring in October is due to the emergence of moths from resting pupae produced in the previous season. Further but diminished activity in November appears to be due to the offspring of these moths. The table following shows the time of emergence of red bollworm moths from pupae found in October to December 1948.

Period of Emergence						Percentage of total Emerging
November to December 1948	..	..	..	..	..	35.0
January to May 1949	..	..	..	..	..	Nil
June to July 1949	..	..	..	..	..	18.3
August to September 1949	..	..	..	..	..	Nil
October 1949	..	..	..	..	..	46.7
						100.0

This suggests that a close season by preventing further breeding of the moths emerging in June and July would limit the activity of the pest to October and November and facilitate control measures.

111. The population of the pink bollworm was not significantly greater than that of 1948, nor was the direct loss of crop due to bollworm damage appreciably higher.

112. Of the minor pest recorded during the season only *Jassids* and possibly *Lygus vosseleri* appear to be important.

113. To ensure an effective close season it is necessary to employ a tool by which cotton may be completely removed from the soil. An implement similar to that used in the Sudan has been tried with some success, but owing to the increased labour required (4 man days/acre as compared with 2½ man days for normal chopping with a hoe) it is unlikely to be popular with the local farmer.

114. Trials were made to test a range of insecticidal sprays and dusts applied at various dates. Although the numbers of insects were considerably reduced the effect on yields was not conclusive and further trials are needed. It appears that sprays are more effective than dusts although the latter are easier to apply.

Cocoa Survey: Annual Report, January 1949 to March 1950

SWOLLEN SHOOT DISEASE

In July 1948 the policy of cutting out cocoa trees infected with Swollen Shoot disease was seriously challenged and for a period of about eight months both the cocoa survey and all control measures were suspended. As soon as work could be resumed, a reconnaissance survey of the affected areas was made in order to determine the extent to which infection had increased. The result of the survey indicated that the incidence of the disease was much more widespread than had previously been suspected and it was clear that urgent measures would have to be taken on a wider scale at once if Swollen Shoot disease was to be brought effectively under control.

COCOA EMERGENCY SCHEME

2. The result of the survey was made known to the Cocoa Marketing Board and a Cocoa Emergency Scheme was accordingly inaugurated with two objects—to bring the Swollen Shoot disease of cocoa under control as effectively and expeditiously as possible, and to execute measures for restoring as far as possible the productive and earning capacity of the farms which have been reduced as a result of the measures necessary to control the disease. The Deputy Director of Agriculture, Western Provinces, was appointed to head the scheme, and was relieved of his normal duties of Regional Deputy.

3. The Board with the consent of the Advisory Committee approved the recruitment of twelve temporary Disease Control Officers, and in July the Officer-in-charge Cocoa Survey made a short visit to England for that purpose. By the end of September the temporary officers arrived in Nigeria and commenced work immediately but their effectiveness was restricted by further obstruction originating not so much from farmers as from other parties who, for reasons best known to themselves, were bent on opposing the “cutting out” policy.

REGENERATION OF OLD FARMS

4. In addition to Swollen Shoot disease there is a much wider problem to be tackled in the Western Provinces, namely, the regeneration of old cocoa farms, which, for reasons of neglect, old age, unsuitable soil, or other causes have passed their prime. It is the responsibility of the new cocoa organisation to plan and co-ordinate measures for the rehabilitation of such farms as well as to seek suitable areas for new planting. The maintenance of the cocoa industry and the adoption of efficient practices is of paramount importance to the future well-being of the Region and its people. Government and the Cocoa Marketing Board are aware of the seriousness of the presence of Swollen Shoot disease and the need to rehabilitate the affected areas. Staff and the necessary facilities have been provided and it now remains for the people of the area to give both campaigns their fullest support.

COCOA SOIL SURVEY

5. A scheme for a cocoa soil survey has been approved by the Nigeria Cocoa Marketing Board. This survey is of vital importance to the whole problem of regeneration as it is necessary to locate the good and bad cocoa soils before a comprehensive rehabilitation programme can be formulated. In circumstances where conditions are unsuitable for rehabilitation with cocoa, alternative crops will be offered.

IMPROVEMENT OF QUALITY

6. It is gratifying to record that the campaign to improve the quality of Nigerian cocoa which was started in 1947 has continued to make excellent progress. The production of

Grade I cocoa has risen from 15 per cent in 1947 to over 80 per cent in 1949. Grade IV has been withdrawn entirely from the buying schedule and the Board has notified its intention to withdraw Grade III with effect from the date of opening of the 1950-51 buying season. This is indeed substantial progress which has brought not only encouraging tributes from overseas but a considerable increase in income to the Nigerian cocoa farmer.

POLITICAL

7. The preliminary survey was completed in January 1949 and cutting of cocoa trees was resumed on 1st February, 1949, after a break of six months. The Maiyegun Society, which had been in opposition, agreed to co-operate and gave considerable help when the campaign was restarted. Six Administrative Officers were seconded to supervise the cutting out. Labour was at first difficult to obtain as the villages could not supply a sufficiency and opposition was still strong at first. In each area considerable propaganda was necessary and cutting was slow at first but gained in momentum as compensation was paid. After three months, cutting reached a figure of over 6,000 trees a day. The Maiyegun Society provided representatives whose main function was to ensure that the owner of the farm was present at both the marking and cutting of his trees. A few weeks after the campaign started, however, a misunderstanding arose among their leaders and the society split into two groups the smaller group styling themselves the Maiyegun League which went into opposition to the campaign. After this, they made several unsuccessful attempts to stop the campaign and it became necessary to prosecute their leaders on three occasions. In July, the Administrative Officers were replaced by Development Officers and the number increased. These were later replaced by specially recruited officers.

STATISTICS UP TO END OF MARCH 1950

8. (a)	Total trees cut out during March 1950	..	..	..	..	78,741
	Total trees cut out up to the end of March 1950	..	..	..	..	1,416,923
(b)	Area of operation : Badeku, Olanla, Osegere, Asejire, Akanran, Ijebu-Ode Road.					
(c)	Number of Senior Service officers employed	..	..	..	..	16
	Number of Junior Service officers employed	..	..	..	..	180
	Number of Labourers employed	..	..	..	..	200
(d)	Senior Service officers on leave	..	..	..	..	Nil.
	Senior Service officers appointed in United Kingdom	..	..	..	..	Nil.
	Senior Service officers arrived in Nigeria	..	..	..	..	Nil.

Note.—These figures include all Cocoa Survey field staff engaged on Swollen Shoot work in the Ibadan area and not staff engaged on normal Cocoa Survey work.

					£	s	d
(e)	Compensation paid out during March 1950	..	..	..	10,079	7	6
	Total compensation paid to date	..	..	..	180,366	2	6

STATEMENT OF EXPENDITURE *

APPENDIX 'U' WESTERN

<i>Head</i>							<i>Expenditure</i>	<i>Expenditure</i>		
<i>Sub-head : Item</i>							<i>1-1-49 to 31-3-49</i>	<i>1-4-49 to 31-3-50</i>		
								£	s	d
1	1	[1]	..	..	..	..	—	660	0	0
	1	[2]	..	..	..	..	—	2,976	2	3
	1	[3]	..	..	..	..	—	270	0	0
	1	[4]	..	..	..	..	—	147	6	8
	1	[5]	..	..	..	..	—	144	0	0
	1	[6]	..	..	..	..	—	8,153	4	7
	1	[7]	..	..	..	..	—	554	4	2
	1	[8]	..	..	..	..	—	837	14	11
	1	[9]	..	..	..	..	—	38	6	2
	1	[10]	..	..	..	..	—	292	0	5
	1	[11]	..	..	..	..	—	247	19	9
	1	[12]	..	..	..	..	—	252	9	9
	1	[13]	..	..	..	..	—	1,008	6	8
	1	[14]	..	..	..	..	—	60	0	0
Total, Personal Emoluments ..							—	15,641	15	4

Other Charges

<i>Sub-head</i>							<i>Expenditure</i>	<i>Expenditure</i>		
							<i>1-1-49 to 31-3-49</i>	<i>1-4-49 to 31-3-50</i>		
								£	s	d
2	..	..	..	..	..	..	—	4,519	13	9
3	..	..	..	..	..	..	—	—	—	—
4	..	..	..	..	..	..	—	395	1	9
5	..	..	..	..	..	..	—	711	8	0
6	..	..	..	..	..	..	—	367	8	5
7	..	..	..	..	..	..	—	13	5	10
8	..	..	..	..	..	..	—	941	17	9
9	..	..	..	..	..	..	—	83	9	10
10	..	..	..	..	..	..	—	1,530	15	10
Total, Other Charges ..							—	8,563	1	2

Special Expenditure

<i>Sub-head</i>							<i>Expenditure</i>	<i>Expenditure</i>		
							<i>1-1-49 to 31-3-49</i>	<i>1-4-49 to 31-3-50</i>		
11	..	..	..	..	..	..	—	9,065	5	11
12	..	..	..	..	..	..	—	450	0	0
13	..	..	..	..	..	..	—	—	—	—
Total, Special Expenditure ..							—	9,515	5	11
Total Head, Appendix 'U' Cocoa Survey							—	33,720	2	5

					<i>Expenditure</i>			<i>Expenditure</i>		
					<i>1-1-49 to 31-3-49</i>			<i>1-4-49 to 31-3-50</i>		
					£	s	d	£	s	d
Suspense Account	..	..	..	..	11,956	7	7	1,902	1	2
Advance Account	..	..	..	..	8,723	2	2	—	—	—

SWOLLEN SHOOT EMERGENCY SCHEME

APPENDIX 'U' WESTERN

1949-50 Personal Emolument

<i>Sub-head : Item</i>	<i>Expenditure</i> 1-1-49 to 31-3-49						<i>Expenditure</i> 1-4-49 to 31-3-50		
							£	s	d
34 [1]	..	..	..	..	..	—	5,711	6	8
34 [2]	..	..	..	..	..	—	341	8	4
34 [3]	..	..	..	..	..	—	—	—	—
Total, Personal Emoluments ..	..	..	..	..	..	—	6,052	15	0

Other Charges

<i>Sub-head</i>	<i>Expenditure</i> 1-1-49 to 31-3-49						<i>Expenditure</i> 1-4-49 to 31-3-50		
							£	s	d
35	..	..	..	..	..	—	1,049	6	5
36	..	..	..	..	..	—	592	9	3
37	..	..	..	..	..	—	689	10	8
38	..	..	..	..	..	—	—	—	—
39	..	..	..	..	..	—	3,337	19	6
Total, Other Charges ..	..	..	..	..	..	—	5,669	5	10

Special Expenditure

<i>Sub-head</i>	<i>Expenditure</i> 1-1-49 to 31-3-49						<i>Expenditure</i> 1-4-49 to 31-3-50		
							£	s	d
40	..	..	..	..	..	—	8,951	10	3
41	..	..	..	..	..	—	5,710	0	0
Total, Special Expenditure ..	..	..	..	..	..	—	14,661	10	3
Total, Swollen Shoot Emergency Scheme ..	..	..	..	..	..	—	26,383	11	1

BOTANICAL AND ENTOMOLOGICAL RESEARCH ON COCOA

APPENDIX 'U' WESTERN

<i>Head</i> <i>Sub-head : Item</i>	<i>Expenditure</i> 1-1-49 to 31-3-49						<i>Expenditure</i> 1-4-49 to 31-3-50		
							£	s	d
33A	..	..	..	..	..	—	1,492	1	2

LONG-TERM REHABILITATION AND NEW PLANTING OF COCOA

<i>Head</i>							<i>Expenditure</i>		<i>Expenditure</i>		
<i>Sub-head</i>							<i>1-1-49 to 31-3-49</i>		<i>1-4-49 to 31-3-50</i>		
									£	s	d
31	..	..	..	..	..	..	—		262	1	9
32	..	..	..	..	..	..	—		11	5	0
33	..	..	..	..	..	..	—		43	4	4
Total, Long-Term Rehabilitation and New Planting of Cocoa ..							—		316	11	1

COCOA IMPROVEMENT SCHEME

<i>Head</i>							<i>Expenditure</i>		<i>Expenditure</i>		
<i>Sub-head</i>							<i>1-1-49 to 31-3-49</i>		<i>1-4-49 to 31-3-50</i>		
									£	s	d
28	..	..	..	..	..	..	—		1,050	0	0
Total, Cocoa Improvement Scheme ..							—		1,050	0	0

SUMMARY

	<i>Expenditure</i> <i>1-1-49 to 31-3-49</i>				<i>Expenditure</i> <i>1-4-49 to 31-3-50</i>				
	£	s	d		£	s	d		
1. Nigerian Cocoa Survey :									
(a) Appendix 'U' Western ..	..	..	..	—	33,720	2	5		
(b) Advance Account ..	..	..	..	8,723	2	2	—		
(c) Suspense Account ..	..	..	..	11,956	7	7	1,902	1	2
2. Cocoa Soil Survey, Appendix 'U' ..	..	..		—			—		
3. Swollen Shoot Scheme, Appendix 'U' ..	..			—	26,383	11	1		
4. Botanical and Entomological Research on Cocoa, Appendix 'U' ..	..	..	..	—	1,492	1	2		
5. Long-Term Rehabilitation, Appendix 'U' ..				—	316	11	1		
6. Cocoa Improvement Scheme, Appendix 'U'				—	1,050	0	0		

* Operated under Advance and Suspense Accounts.

The School of Agriculture, Ibadan

STAFF

1. In January 1949, Mr D. W. H. Baker, Principal of Schools, Ibadan, was seconded to the Colonial Development Corporation for work in connection with the Settlement Scheme at Mokwa and in March he assumed duty in the University College, Ibadan, as Head of the Faculty of Agriculture, Forestry and Veterinary Science. Mr T. A. Phillips assumed duty as Acting Principal on 28th February and was promoted to the substantive rank as from 1st April, 1949.

2. Except for the first two months of 1949 the School has been adequately staffed as far as numbers are concerned. The resignation of the School Agricultural Officer while on leave and the departure of two members of Junior Service Staff on Scholarship, however, necessarily caused some dislocation and reduction in quality of teaching staff for the time being.

3. The policy of providing the best staff available for the School has been continued and, in order that the standards of teaching may be further raised, provision has been made for the post of an Agricultural Education Officer in the 1950-51 estimates. The Senior Departmental Research Specialists in Entomology and Plant Pathology gave courses of lectures to the Assistant Agricultural Officer classes and the Deputy Director, Western Provinces, gave a short general course of lectures.

VISITORS

4. Interest in the work of the School has been taken by a number of distinguished visitors from overseas including Mr Norris Dodd, the Director-General of the Food and Agriculture Organisation of the United Nations and his party ; Dr McCall, Dr Lambert and Dr Cline of the Mission of American Agricultural Experts who were accompanied by Mr Nye, the Deputy Agricultural Adviser to the Secretary of State for the Colonies ; Mr H. J. Page, Principal of the Imperial College of Tropical Agriculture, Trinidad ; Miss H. Neatby, Assistant Director of Education, Uganda, who was accompanied by Miss G. Plummer, Deputy Director of Education (Women).

COURSES

5. The teaching policy and curriculum have been under review and important changes in the length and nature of the courses of training have been made during the past fifteen months.

6. The course for Agricultural Assistants, which previously covered two years, has been extended to two and half years in the School, the additional six months being taken up by a practical work term covering most of one planting season. Previously students obtained much of this practical experience in the course of their duties after posting but owing to staff shortages and increasing work Provincial Officers are now so hard pressed that they have not the time to give the required attention to such individuals and their needs for staff, well trained for the duties expected of them, is greater than ever.

7. The course of training for Assistant Agricultural Officers which was commenced in 1947 to replace the Higher College Diploma course (when the latter lapsed on the absorption of the Higher College into the University College) is being discontinued, and no entrants for this class were selected in 1950. It is intended to replace it as soon as possible by a second course of training for outstanding Agricultural Assistants who have given good service in the field for a period of three and half to four and half years. This procedure will accord more closely with the recent creation of the new Senior Agricultural Assistants grade which

now enables Agricultural Assistants to reach a salary of £370 per annum and to accept the higher responsibilities of that post.

8. Discussions have been held with the Principal Designate of the Regional Colleges as to the best way in which Departmental training can make use of and dovetail with the training to be provided by the Regional College.

FIELD OVERSEER COURSE

9. It has been decided that the training of Field Overseers should be undertaken by the School in 1950-51 and the organisation of this course is now in hand.

WOMEN STUDENTS

10. The course for Agricultural Assistants was opened to women in 1948 but there were no applicants for the 1949 course. There were a number of applicants for the 1950 class and three women were selected. They commenced training in January 1950, and are being treated in all respects as of equal status with the men students. In view of the importance of the women of this country in Agriculture, this is a very real step forward.

RURAL EDUCATION DEPARTMENT STUDENTS

11. Two students are in training in the School for the Rural Education Department. One entered in 1949 and one in 1950.

NUMBERS OF STUDENTS

12. The following figures show the intake and output of students during the period under review.

				<i>Agricultural Assistants</i>		<i>Assistant Agricultural Officers in Training</i>			<i>Total</i>
				<i>First Session</i>	<i>Second Session</i>	<i>First Session</i>	<i>Second Session</i>	<i>Third Session</i>	
<i>School Year 1949 :</i>									
Already in School, January 1949	..			—	15	3	6	8	} 64
Recruited, January 1949	..	..		30	—	2	—	—	
Resigned during 1949	..	..	..	2	3	—	—	—	
Failed School Certificate	..	..		1	—	—	—	—	} 7
Failed Final Examination	..	..		1	—	—	—	—	
Passed Final Examination	..	..		26	12†	5	6	8†	57
<i>School Year 1950 :</i>									
Already in School, January 1950	..			—	26	—	5	6	} 73
Recruited, January 1950	..	..		36	—	—	—	—	
Resigned	..	..	..	—	3	—	—	—	3
Total at 31-3-50	..	..		36	23	—	5	6	70†

† Available for Posting, January 1950.

‡ Includes two students for Rural Education Department.

It will be seen that the intake of Agricultural Assistants has been increased from thirty to thirty-six which includes three women. This is an attempt to offset wastage which has been heavy in previous years when the first flush of enthusiasm for outdoor technical work has

abated and when some students are disappointed to find that their academic performances do not put them in the upper reaches of the class so that their prospects of rapid advancement diminish. There is then a very natural tendency to try their hand at something else. Thirty-six is a very large class and places a considerable strain on the available training facilities.

13. Two members of staff and one student have been granted Government Scholarships to train them for Senior Service posts.

BUILDINGS AND EQUIPMENT

14. The Development Building Programme is almost complete with the erection of a class room-common room on the farm, a farm office and workshop and four B type staff quarters by the Public Works Department. The purchases of a Tractor and implements in the next financial year have been planned so that teaching in the School can be kept abreast of current development in mechanisation. Buildings and quarters for the Field Overseer course are to be erected in 1950-51.

RESEARCH

15. The Assistant Agricultural Officers in training are each given a research problem to work on. The following useful information has been obtained from these problems.

Feeding Trial with Pigs

16. Five pig rations involving varying proportions of concentrate rations and cassava roots were compared during 1948 and 1949 in an attempt to cheapen the production ration for pigs up to 200 lb live weight. Results have shown that fairly satisfactory live weight increases and carcass conformation are obtained from a 'Lehmann' system of feeding in which a basic concentrate ration of five parts palm kernel meal, one part maize, one part blood meal is fed and the pig is allowed to adjust its own nutritive ratio by taking cassava as it requires. The concentrate portion of the ration appeared somewhat unpalatable. The substitution of groundnut cake for some or all of the palm kernel cake would probably correct this. The cheapest possible balanced ration made up of blood meal and cassava alone proved entirely unsuitable.

Nigerian Birdseye Chillies (Capsicum)

17. It has been shown that the application of farm-yard manure or fertilisers to plants of Nigerian Birdseye Chillies in the nursery during the first month of the plant's life result in considerable increases in yield of fruits when transplanted out in the field. Phosphate appears to be the most important constituent for good fruit production on Ibadan soils.

Maize

18. Hybridisation of the varieties Lagos White and Tsolo was carried out in 1947 and 1948 and the hybrid tested against the two parents in full-scale yield trials in 1948 and 1949 on both early and late maize crops. The hybrid was significantly higher yielding than either of the parents. In 1947 early crop above 50 per cent increase in weight of green cobs was obtained, though the experimental plots were rather small. In 1947 late crop, increases of nearly 70 per cent were obtained over Lagos White and in 1948 early crop increases of 15 per cent to 18 per cent increase were obtained over Lagos White and 23 per cent to 26 per cent over Tsolo.

Pawpaw Culture and Papain Production

19. Experiments on pawpaw culture and papain production were commenced in 1948 and useful information on spacing, establishments and tapping techniques has been obtained. The work is still in progress. Samples of papain have been sent to the Imperial Institute for analysis and report.

Spear Grass Control

20. Observations and experiments on spear grass eradication by cultivation methods and shading have been carried during the period 1947 to 1949. It has been shown that deep cultivation and removal of the rhizomes is the only sure means of eliminating the weed quickly. Shading is effective in reducing the population of the weed.

Experimentation : Use of Microplot Technique

21. A technique of experimentation using very small plots and young maize for assessing soil fertility deficiencies has been tested. The technique originated in the West Indies where it is used in sugar cane soils. There appears to be reasonable correlation between the results obtained from the technique and those obtained from large-scale check experiments with maize for grain production.

Yam Propagation

22. Attempts have been in progress since 1946 to propagate yams from stem cuttings and so eliminate the very heavy seed rate for planting this crop. A percentage of the cuttings obtained from the shoots put out by yams in storage can be rooted and a small seed yam obtained in one year. No success has been obtained with cuttings taken from growing plants in the field neither has the application of hormone solutions and powders to either type been found to have any beneficial effect.

School of Agriculture, Samaru

STAFF

1. There was one Senior Service Officer in charge of the School throughout the year, assisted, at the end of the period, by eight Junior Service Officers. One Assistant Agricultural Officer entered the University College, Ibadan, and was replaced by one of the first products of the Ibadan Supplementary AAO. Course.

2. Posting to Training Schools has never been popular with Agricultural Staff and in view of this, the unremitting and selfless work done by Junior Staff at the School deserves special mention. It is only their constant devotion to the wider interests of the country that has enabled efficient training to be carried out with the few staff available and with the considerable amount of reorganisation and development described below.

COURSES

3. The School continued to provide a three-year course for Middle IV Agricultural Assistants the content of the course being modified so as to make it of a much more practical nature than was the former course for Middle VI Assistants.

4. In March 1950, an eleven-month Junior Course was started for Middle II Native Administration employees and learners. This Junior Course has taken the place of a Field Overseers' Course which has been planned since 1941 but which could not be started owing to shortage of buildings and of teaching staff.

TRAINEES

5. The total number of trainees in residence rose from fifty-five at the beginning of 1949 to a record of eighty-five on 31st March, 1950, of whom seventeen were third year Agricultural Assistants, twenty-two second year, and fifteen first year, the remaining thirty-one being Junior Course Native Administration Trainees. Ten third year Agricultural Assistants successfully completed their training and were posted to stations in February 1950.

6. The table below shows the effects both of admitting Native Administration Assistants for training in Agricultural Assistants Classes, and of giving priority of entry to suitable Middle IV Northerners.

AGRICULTURAL ASSISTANTS CLASSES

<i>Year class started</i>	1945	1946	1947	1948	1949	1950
Number admitted	14	19	19	31	23	28
Number sent by NAs.	0	0	0	5	4	6
Number of Northerners	1	2	5	12	20	28
Number of Middle IV Holders	0	0	0	12	21	27

7. Unfortunately, the increased intake of trainees in 1948, 1949 and 1950 will not necessarily result in a proportionately increased output of trained technical assistants. Wastage continues to be high, a number of Middle IV Northerners being so weak in English as to be unable to follow even the modified course specially designed for them. The figures below show that a regular wastage of 40 to 50 per cent may be expected in each class, and this is the most important single feature in the training of Junior Technical Staff for the Department.

<i>Year of Recruitment</i>	1945	1946	1947	1948	1949	1950
Number admitted	14	19	19	31	23	28
Wastage from all causes	8	7	9	15	5	—
Percentage Wastage	57%	37%	47%	53%	22%	—
	Over a three-year Course			in two years	in one year	

ORGANISATION OF COURSES

8. During the period under review the content of Agricultural Assistant Courses was modified considerably in order to produce a more practical type of Assistant with more "know-how" at the expense of "know-why". This was partly in order to allow for the reduction in standard of entry and partly to meet the wishes of officers in the field. It is, however, a natural development in view of the increased output of Assistant Agricultural Officers from the School at Ibadan and of the anticipated output of more academic types from the University College, Ibadan and, eventually, from the proposed Regional Polytechnic. Thus basic Chemistry, Botany and Zoology, Theory of Statistics, Soil Chemistry and Animal Nutrition, etc., have been reduced to an explanatory minimum, and more time is being spent on the practical details of organisation of labour, stores, office records and agricultural operations. In 1949 the Agricultural Engineering Section, owing to increased staff was able to give a short course to third year Assistants.

9. Farm work for Agricultural Assistants is normally two hours per day, though Assistants on livestock do four hours per day, and during planting and harvesting seasons all Assistants may do up to six hours a day, classroom work being suspended for up to three weeks at a time.

10. The eleven-month Junior Course which started in March 1950, is essentially a practical one. A start has been made on the basis of five and half hours of practical work and one and half hours of classroom work per day.

ORGANISATION OF FARMS

11. At the beginning of the period under review the School farm consisted of one set of mud and thatch farm buildings and approximately 12 acres under cultivation.

12. At the end of the period there were three training farms each with its own set of farm buildings, stores, office, cattle, poultry, etc., and each with approximately 12 acres under cultivation. One of these is operated by first year Agricultural Assistants and the other two by Junior Course Native Administration Trainees.

13. Additional land had been allocated for expansion of existing poultry, vegetables, crop type collections, and plant selection and breeding which with work on pigs constitutes the practical farm work for second year Assistants.

14. Permanent Cattle Pens, Cart Sheds, and Tool and Crop Stores had been erected on a new experimental farm of some 40 acres and fourteen experiments covering approximately 22 acres had been laid down operated and harvested by third year Assistants.

15. At the end of the period the School possessed forty-three head of cattle (mostly white Fulani), 128 head of poultry (Black Leghorns, Black Australorps, Rhode Islands and selected Nigerian birds), seventeen goats and 53 acres under cultivation.

QUARTERS AND HOSTEL

16. By the end of the period under review sixty-eight new permanent students quarters and two staff quarters had been handed over by the Public Works Department and twenty-five temporary quarters were still in use.

17. The new hostel opened in March 1950 and provided complete messing for forty-five trainees.

Agricultural Department

SUMMARY OF EXPENDITURE AND REVENUE FOR PERIOD 1st JANUARY, 1949 TO 31st MARCH, 1950

EXPENDITURE

	<i>Personal Emoluments</i>	<i>Other Charges</i>	<i>Special Expenditure</i>	<i>Total</i>
	£	£	£	£
Main Agriculture	199,380	283,325	75,165	557,870
Agricultural Development	56,696	62,659	34,570	153,925
Oil Palm Research Station	15,672	48,699	80,455	144,826
Cocoa Scheme	21,828	39,894	24,177	85,899
Production Schemes	—	66,441	—	66,441
Totals	£ 293,576	501,018	214,367	1,008,961

REVENUE

	£
Sales of Agricultural Products	20,312
Production Schemes	66,463
Development Schemes	1,339
Oil Palm Research Station	371
Total	<u>£88,485</u>

Annual Report—Agricultural Department

FINANCIAL STATEMENT 1st JANUARY, 1949 TO 31st MARCH, 1950

EXPENDITURE

<i>Service</i>	<i>Personal Emoluments</i>	<i>Other Charges</i>	<i>Special or Capital Expenditure</i>	<i>Total</i>
	£	£	£	£
1. <i>Main Agriculture :</i>				
Nigerian	62,958	40,434	5,723	109,115
Northern	60,554	145,435	50,568	254,557
Western	42,159	50,287	1,948	94,394
Eastern	33,709	49,169	16,926	99,804
Total, Main Agriculture	£ 199,380	283,325	75,165	557,870
2. <i>Agricultural Development :</i>				
(a) <i>Development and Welfare</i>				
Nigerian	783	146	—	929
Northern	10,246	2,403	—	12,649
Western	3,327	804	578	4,709
Eastern	1,662	616	559	2,837
Total (a)	£ 16,018	3,969	1,137	21,124
(b) <i>Colonial Development and Welfare Schemes :</i>				
Nigerian	14,991	2,786	—	17,777
Northern	6,592	30,375	7,383	44,350
Western	9,318	14,970	6,920	31,208
Eastern	9,777	10,559	19,130	39,466
Total (b)	£ 40,678	58,690	33,433	132,801
Total 2(a) and (b)	£ 56,696	62,659	34,570	153,925
3. <i>Research Scheme :</i>				
Oil Palm Research Station	15,672	48,699	80,455	144,826

EXPENDITURE—continued

Service	Personal Emoluments	Other Charges	Special or Capital Expenditure	Total
4. <i>Cocoa Scheme</i> :				
(a) <i>Nigerian Cocoa Survey</i>				
Western	15,642	8,563	9,515	56,301
	—	8,723 (a)	—	—
		13,858 (b)		
Eastern	133	106	—	239
Total (a)	£ 15,775	31,250	9,515	56,540
(b) <i>Improvement of Quality of Cocoa</i>				
Western	—	1,050	—	1,050
Eastern	—	—	—	—
Total (b)	£ —	1,050	—	1,050
(c) <i>Long-Term Rehabilitation and New Planting of Cocoa</i>				
Western	—	316	—	316
Eastern	—	117	—	117
Total (c)	£ —	433	—	433
(d) <i>Botanical and Entomological Research on Cocoa</i>				
Western	—	1,492	—	1,492
(e) <i>Swollen Shoot Emergency Measures</i>				
Western	6,053	5,669	14,662	26,384
Total (a) to (e)	£ 21,828	39,894	24,177	85,899
5. <i>Production Scheme*</i> :				
Pig Production	—	42,411	—	42,411
Kano Dairy	—	1,781	—	1,781
Badeggi Rice Mill	—	21,473	—	21,473
Baro Rice Mill	—	751	—	751
Lafiagi Rice Mill	—	25	—	25
Total	—	66,441	—	66,441

(a) Advance Account.

(b) West African Cocoa Research Institute Fund.

* Operated under Suspense Accounts.

REVENUE

	Itemised Total	Sub-head Total	
	£	£	
1. <i>Sales of Agricultural Products</i> :			
Nigerian	4,870		
Northern	6,634		
Western	3,579		
Eastern	5,229		
		20,312	
2. <i>Production Schemes*</i> :			
Pig Production	48,784		
Kano Dairy	2,223		
Badeggi Rice Mill	12,376		
Baro Rice Mill	3,080		
Lafiagi Rice Mill	—		
		66,463	
3. <i>Development Schemes</i> :			
Nigerian	—		
Northern	982		
Western	203		
Eastern	154		
		1,339	
4. <i>Oil Palm Research Station</i>	371	371	
	88,485	88,485	

Credited to Expenditure Votes.

Credited to Expenditure Vote.

* Operated under Suspense Accounts.

